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ABSTRACT

This competency-based curriculum guide on the specialty area of carpentry is part of the Introduction to Construction series. The series is designed with the flexible training requirements of open shop contractors, preapprenticeship programs, multicraft high school programs, technology education programs, and cooperative education programs in mind. This guide contains four instructional units: carpentry materials, carpentry tools, carpentry layout, and carpentry basic skills. Eight basic components form a unit of instruction: performance objectives (unit and specific objectives), suggested activities for the teacher (an outline of unit contents and an instructor's guide), information sheets, assignment sheets, job sheets, transparency masters and supplements, tests, and answers to tests and assignment sheets. (YLB)

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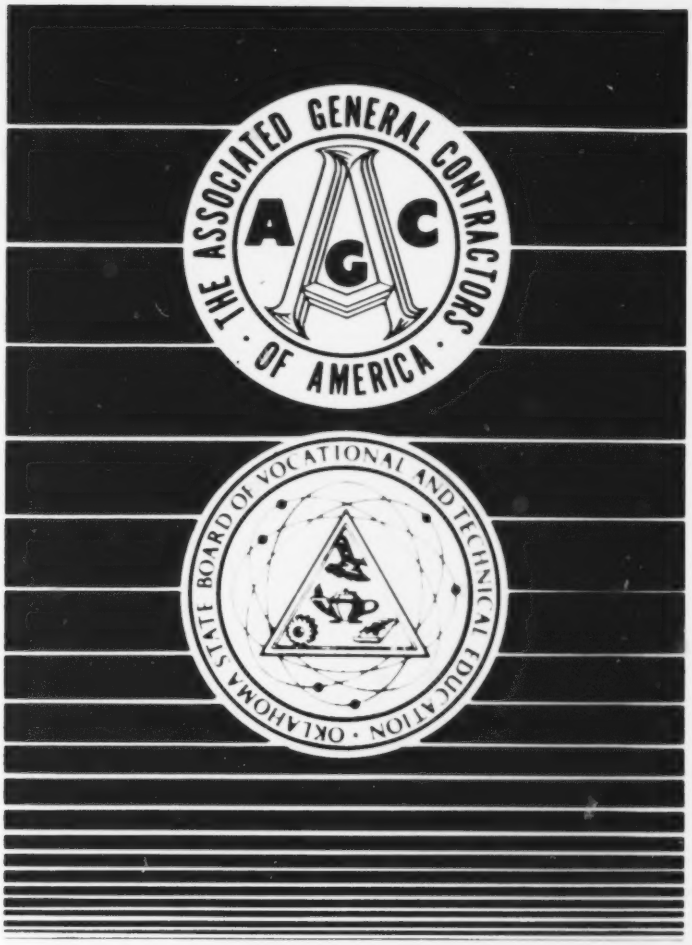

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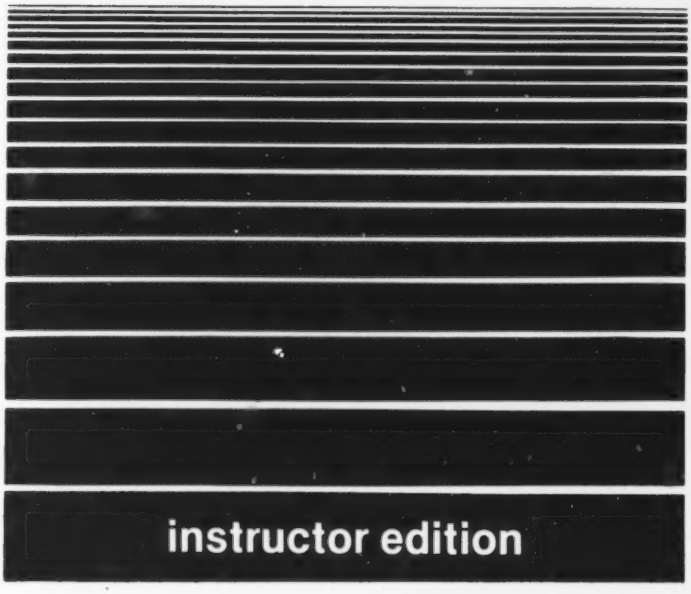
Introduction to Carpentry



Introduction to Construction Series

88.005728

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INTRODUCTION TO CARPENTRY
COMPETENCY PROFILE

Student _____ Soc Sec No ___ ___ ___
Last First MI

PROGRAM _____ Grade 9 10 11 12 Adult SCHOOL _____

INSTRUCTOR _____ SCHOOL ADDRESS _____ PHONE _____

STUDENT'S HOME ADDRESS _____ DATE OF BIRTH _____ PHONE _____

STUDENT'S EMPLOYER _____ ADDRESS _____ PHONE _____

CONTACT IN CASE OF EMERGENCY _____ PHONE _____

ADDRESS _____

OR

ADDRESS _____ PHONE _____

The above information can be used for school records and/or to ensure safety of students. This confidential information is not to be released to employers or to the general public.

ON-JOB TRAINING/WORK EXPERIENCE

DURATION OF EMPLOYMENT	JOB TITLE	EMPLOYER	SUPERVISOR'S NAME	ADDRESS OF EMPLOYER	PHONE

This agency does not discriminate on the basis of race, creed, color, national origin, sex, age, veteran status, qualified handicap, or disability.

SPECIFIC JOB COMPETENCIES

Directions: Evaluate the trainee using the rating scale below and check the appropriate number to indicate the degree of competency achieved. The numerical ratings of 4, 3, 2, 1, and 0 are not intended to represent the traditional school grading system of A, B, C, D, and F. The descriptions associated with each of the numbers focus on level of student performance for each of the tasks listed below. The written test score line is provided for optional teacher use. It may not be applicable in all cases. "NA" is an appropriate entry in such instances.

Rating Scale:
4 — Skilled — can perform independently with no additional training.
3 — Moderately Skilled — has performed independently during training program; limited additional training may be required.
2 — Limited Practice — has practiced during training program; additional training is required to develop skill.
1 — Exposure Only — general information provided with no practice time; close supervision needed and additional training required.
0 — No Exposure — no information nor practice provided during training program; complete training required.

4 3 2 1 0

Carpentry Materials

1. Write a lumber requisition.
2. _____

WRITTEN TEST SCORE _____

4 3 2 1 0

Carpentry Tools

1. _____

WRITTEN TEST SCORE _____

4 3 2 1 0

Carpentry Layout

1. Use a framing square and rule to lay out an 8-inch wall corner.
2. Use a hand level.
3. Lay out wall and partition locations on floor.
4. Lay out wall sections for a structure.
5. Lay out ceiling joists.
6. _____

WRITTEN TEST SCORE _____

4 3 2 1 0

Carpentry Basic Skills

1. Use a hammer properly.
2. Use a hand saw properly.
3. Construct solid headers.
4. Construct wall corners.
5. Construct partition Ts.
6. _____

WRITTEN TEST SCORE _____

Use of This Document

This document can be used to record information about the student and the skills mastered by the student. This information is useful in documenting student progress during the training program and to provide information about the student's qualifications to potential employers and for entry into advanced training programs. Instructors using AGC-CIMC instructional materials are authorized to reproduce this document as required for use in their training programs.

88-005728

Introduction to Carpentry

Developed as a Cooperative Project by
The Associated General Contractors of America
William K. Healy, Chairman, Manpower and Training Committee
and
Oklahoma State Board of Vocational and Technical Education
John Folks, Chairman
Roy Peters, Jr., Director

88-005728

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INTRODUCTION TO CARPENTRY

TABLE OF CONTENTS

Unit I	Carpentry Materials	ITC-1
Unit II	Carpentry Tools	ITC-63
Unit III	Carpentry Layout	ITC-149
Unit IV	Carpentry Basic Skills	ITC-185

A more advanced curriculum on carpentry is available from The Associated General Contractors of America, 1957 E Street, N.W., Washington DC 20006, phone (202) 393-2040 or contact the Oklahoma State Department of Vocational and Technical Education/Curriculum and Instructional Materials Center, 1500 West Seventh Avenue, Stillwater, Oklahoma 74074-4364.

FOREWORD

In 1985, The Associated General Contractors of America (AGC) met with representatives of the Oklahoma Curriculum and Instructional Materials Center (CIMC) to discuss the possibilities of developing, as a cooperative project, a course of instruction designed for training individuals who choose to seriously explore careers in construction.

This publication is the result of those original discussions and close coordination among general contractors and vocational educators. This series represents a conscious effort to coordinate the practical experience of personnel in the construction industry with the best instructional methods of those in the field of vocational education.

Although this series reflects a systematic approach to instructional materials development and the latest in educational technology innovations, the information in *Introduction to Carpentry* should be adapted and modified to coincide with local conditions in mind.

Roy Peters, Jr., Director
Oklahoma State Department of
Vocational and Technical Education

William K. Healy, Chairman
Manpower and Training Committee
The Associated General Contractors
of America

PREFACE

For many years The Associated General Contractors of America (AGC) has recognized the need for providing quality compentency-based instructional materials for the construction industry. AGC and the Oklahoma State Department of Vocational and Technical Education have met this challenge by providing nationally recognized curriculum and services since 1972. In 1986 AGC and Oklahoma's Curriculum and Instructional Materials Center (CIMC) determined a significant need for a series that would address training needs of open shop contractors, preapprenticeship programs, multi-craft high school programs, technology educational programs, CVET, and cooperative education programs. The Introduction to Construction Series was designed with the flexible training requirements of these groups in mind.

The Introduction to Construction Series begins with *Fundamentals to Construction* and progresses to twelve spin-off specialty publications. *Fundamentals of Construction* covers basic knowledge necessary for all individuals to in construction. Each specialty area covers basic skills necessary for entry-level employment. Both vocational education and the construction industry offer more advanced courses in each specialty area and should be considered by individuals wishing to establish careers in the industry. Competency profiles (provided in the teacher edition) for the Introduction to Construction Series articulate with several more advanced AGC publications as well as publications developed by the Mid-America Vocational Curriculum Consortium (MAVCC).

Publications in this series include:

- Introduction to Bricklaying
- Introduction to Carpentry
- Introduction to Concrete Masonry
- Introduction to Ironwork
- Introduction to Electricity
- Introduction to Plumbing
- Introduction to Heating, Ventilation, and Air Conditioning
- Introduction to Sheet Metal
- Introduction to Roofing
- Introduction to Drywall
- Introduction to Insulation
- Introduction to Welding

USE OF THIS PUBLICATION

Instructional Units

Introduction to Carpentry contains one section and four instructional units. A standard format was established in 1970 for development of instructional materials for all Oklahoma vocational teachers. This format includes eight basic components that form a unit of instruction: performance objectives, suggested activities for the teacher, information sheets, assignment sheets, job sheets, transparency masters and supplements, tests, and answers to tests and assignment sheets. Depending on the specific objectives, there may or may not be transparency masters, supplements, assignment sheets, or job sheets included in the unit of instruction.

All of the unit components "zero in" on measurable and observable learning outcomes. Teachers are encouraged to supplement, personalize, localize, and motivate with these materials in order to develop a complete teaching/learning process.

Units of instruction are designed for use in more than one lesson or class period of instruction. Careful study of each unit of instruction by the teacher will help him or her determine the following

- Amount of material that can be covered in each class period
- Skills that must be demonstrated
  - Supplies and equipment needed
  - Amount of practice needed
  - Amount of class time needed for demonstrations
- Supplementary materials, such as pamphlets and filmstrips, that must be ordered
- Resource people to contact

Performance Objectives (white pages)

Each unit of instruction is based on the performance needed for successful employment in an occupational area. Performance objectives are stated in two forms: unit objectives, stating the subject matter to be covered in a unit of instruction; and specific objectives, stating the performance necessary to reach the unit objective. Since the objectives of the unit provide direction for the teaching/learning process, it is important that teachers and students have a common understanding of the intent of the objectives.

The objective sheet should be given to students and referred to throughout the teaching/learning process. This will help answer any questions concerning performance requirements for each instructional unit. The objectives can also help determine teaching strategies and instructional methods. Prepare for each unit by deciding how each objective can best be taught.

The objective sheet may also be used as a quick pretest to determine students' prior knowledge and to determine whether further study or activities are necessary. Teachers should feel free to modify, delete, or add objectives in order to meet the needs of the students and community. When changes in objectives are made, the teacher should remember to supply the needed information, assignment and/or job sheets, and criterion test items.

Suggested Activities (pink pages), instructor edition only

Suggested activities are included only in teacher materials. The suggested activities pages include an outline of the unit contents and an instructor's guide designed to assist teachers in planning their presentation of the unit. The instructor's guide provides suggestions for delivery and/or presentation during the instructional process. Read the suggested activities before teaching the units so that supplemental materials can be obtained, audiovisual materials prepared, and outside resources contacted. Duties of the teacher will vary according to the particular unit.

The references that are listed in the suggested activities are ones used in the development of each unit. They may be used by the teacher to supplement her or his knowledge of the subject area or to help students with particular interests or occupational objectives in the area covered.

The suggested activities section of the unit also includes supplements and transparency masters. Each of these components provides information in a special way. Supplements may consist of motivational materials, review or practice materials such as crossword puzzles and self-tests, or charts and reference materials. Supplements are designed to be copied and distributed to individual class members or to the class as a whole. Suggestions for their use are included in the instructor's guide. Transparencies direct the class' attention to the topic of discussion. Transparencies may present new information, or they may reinforce information presented in the information sheet. They are particularly effective when identification or analysis is necessary. You may want to make transparencies and place them in the notebook where they will be immediately available for use.

Information Sheet (green pages)

The information sheet provides "must know" content essential for meeting the cognitive (knowledge level) objectives of the unit. The information is written in a topical-outline form and is keyed to the specific objectives.

Teachers will find that the information sheet serves as an excellent guide for presenting background knowledge necessary to develop the skills specified in the unit objective. The information sheet may also be used for coordination activities and advisory committees.

Students should read the information sheet before the information is discussed in class. Space is provided in margins for students and teachers to add notes that supplement, localize, personalize, or provide motivation for each unit.

Assignment Sheets (brown pages)

Assignment sheets give students a chance at problem solving, self-assessment, and/or practical experience. They assist students in the application of knowledges that are necessary prerequisites to skill development. Assignment sheets may be given to the student for completion in class or may be used for homework assignments. Answer sheets are provided

when appropriate and can be used by the student and/or teacher for checking student progress. The scores of those assignment sheets listed in the specific objectives should be averaged with the unit test score, as the skills addressed in these assignment sheets are considered necessary in meeting the unit objective.

Job Sheets (blue pages)

Job sheets are another important segment of a unit of instruction. The job sheets provide a list of equipment, tools, and materials needed to complete a manipulative or psychomotor skill. They describe a step-by-step procedure needed to complete each task or job. Diagrams, photographs, and illustrations are provided to assist students in achieving the skill.

The teacher should demonstrate to students the procedures outlined in each job sheet. Furthermore, the teacher needs to localize the job sheet according to the equipment and supplies available in the local lab or shop situation. Job sheets also furnish potential employers with a picture of the skills being taught and the performances they might reasonably expect from a person who has had this vocational instruction.

Job sheet performance should be evaluated by the instructor and averaged with the unit test score, as the skills addressed in the job sheets are considered necessary in meeting the unit objective.

Tests (white pages), instructor edition only

The test provides criterion-referenced evaluation of every objective listed in the unit of instruction. It is crucial to note that both paper/pencil and performance objectives must be evaluated.

It is recommended that the tests be divided into shorter tests covering three or four objectives at a time and given soon after those objectives have been covered. A selection of questions from the units covered may be used for final tests at the end of each term if desired. If objectives have been added, deleted, or modified, be sure to make the changes on the test.

The acceptable response on a unit test, 80 percent in most units, may be raised or lowered to fit the topic or students' ability levels. The percentage applies to the overall score, not to each question. The final unit grade should be obtained by using the paper/pencil score and evaluations of student demonstrations of the desired skills.

Answers to Test and Assignment Sheets (pink pages)

Answers to test and assignment sheets are components designed to assist the teacher in evaluation of student performances.

Page Numbering

Each publication from the Curriculum and Instructional Materials Center (CIMC) is assigned a specific abbreviation. For example, *Introduction to Carpentry* has been abbreviated ITC. The units are then numbered consecutively within each section. An example of a page number is ITC-1. Since most CIMC publications are loose leaf, this system of page numbering was adopted so that pages from different manuals would not get mixed up.

Methods of Disseminating Material

For best results, provide student materials for each student. Student materials contain everything but the test, supplements, answers to assignment sheets, and suggested activities.

Teaching Methods

It is a challenge to keep students motivated. Supplement the objectives by providing the "why," personal experiences, and current information. Prepare for each unit by deciding how each objective can best be taught. Allow students to become involved in preparing and planning.

Competency Profiles

Competency profiles are used to document student performance. The profile contains a list of the specific job competencies that a student should achieve prior to leaving the training program. A competency profile master is provided in the instructor edition of each publication. Duplicate the profile and distribute to students as required.

Other AGC Publications: AGC updates curriculum products on a continuing basis. For a free catalog describing other AGC products, call the AGC national office at 1-202-393-2040.

CORRECTIONS AND SUGGESTIONS

The Curriculum and Instructional Materials Center (CIMC) wants to provide vocational instructors and students with materials that are accurate and effective. Although the CIMC strives to maintain the highest standards of development and production, oversights occasionally do occur. If you find any errors in this or other CIMC publications, or have suggestions for improving their usefulness in vocational programs, please notify the CIMC staff. One easy way of pointing out errors is to make a photocopy of the affected page and to indicate the correction on the copy. You can mail the information to the CIMC, where it will be used to correct the publication before the materials are reprinted.

To ensure that the material is updated on a timely basis, it is important that you notify the (CIMC) of necessary corrections as soon as possible after discovering the error. Do not assume that someone else will notice the error and inform the CIMC; other users may be making the same assumption. Please send corrections and recommendations for improving this publication to the following address:

Coordinator for Curriculum Development
Curriculum and Instructional Materials Center
Oklahoma State Department of Vocational and
Technical Education
1500 West Seventh Avenue
Stillwater, Oklahoma 74074-4364

CARPENTRY MATERIALS
UNIT I

UNIT OBJECTIVE

After completing this unit, the student should be able to list common softwood, hardwood, and plywood grades and match common hardwoods and softwoods to their uses. The student should also be able to compute lumber quantities and write a lumber requisition. The student will show this ability by completing assignment sheets and unit test with a minimum score of 80 percent.

SPECIFIC OBJECTIVES

After completing this unit, the student should be able to

1. Match terms associated with lumber to their correct definitions.
2. Select from a list characteristics to consider in using lumber.
3. Match common softwoods to their correct uses.
4. Match common hardwoods to their correct uses.
5. Identify common defects in lumber.
6. Match types of softwood lumber to their correct grades.
7. Select from a list standard hardwood lumber grades.
8. Match to their correct descriptions letters designating veneers used in softwood plywood.
9. Distinguish between standard interior and exterior softwood plywood grades by face veneer.
10. Match standard hardwood plywood grades to their correct descriptions.
11. Identify types of plywood core construction.
12. Write actual sizes for given nominal sizes of softwood lumber.
13. Write actual sizes for given nominal sizes of hardwood lumber.
14. Select from a list solid softwoods used for paneling.
15. Select from a list solid hardwoods used for paneling.
16. Select from a list types of woods used for trim and moldings.

OBJECTIVE SHEET

17. Identify types of trim and moldings.
18. Select from a list pennyweights of nails most often used in framing.
19. Match types of lumber to their correct units of measure.
20. Compute lumber quantities.
21. Write a lumber requisition.

CARPENTRY MATERIALS
UNIT I

SUGGESTED ACTIVITIES

I. Unit contents

A. Objective sheet

B. Suggested activities

C. Supplements

1. Supplement #1 — Lumber Grading

2. Supplement #2 — Plywood Grades and Grade Trademarks

D. Transparency masters

1. TM #1 — Clear Cutting

2. TM #2 — Nails

3. TM #3 — Lengths of Nails by Pennyweight

E. Information sheet

F. Assignment sheets

1. Assignment Sheet #1 — Compute Lumber Quantities

2. Assignment Sheet #2 — Write a Lumber Requisition

G. Answers to assignment sheets

H. Test

I. Answers to test

II. Instructor's guide

A. Obtain materials to supplement unit.

1. Films

a. *In Pursuit of Happiness,* 16mm, color/sound, 25 minutes. American Plywood Association, 1119 A Street, Tacoma, Washington 98401.

b. *In Search of the Last Redwood,* 16 mm, color/sound, 25 minutes. California Redwood Association, 1 Lombard Street, San Francisco, California 94111.

c. *Out of Sight and Underfoot,* 16 mm color/sound, 20 minutes. National Particle Board Association, 2306 Perkins Place, Silver Spring, Maryland 20910.

SUGGESTED ACTIVITIES

2. Booklets

   a. "Appalachian Oak in Fine Cabinets." Appalachian Hardwood Manufacturers, Inc., P.O. Box 427, High Point, North Carolina 27261.

   b. "Beautiful Woods." Frank Paxton Lumber Company, 6311 St. John Avenue, Kansas City, Missouri 64123.

   c. "Paxton Beautiful Woods," May, 1983. Frank Paxton Lumber Company, 1815 S. Agnew Avenue, P.O. Box 82215, Oklahoma City, Oklahoma 73148.

   d. "Redwood Lumber Guide." California Redwood Association, 1 Lombard Street, San Francisco, California 94111.

   e. "The Story of Particle Board." National Particle Board Association, 2306 Perkins Place, Silver Spring, Maryland 20910.

3. Competency profiles

   (NOTE: A master of the competency profile for this book is provided at the front of the instructor edition. You may duplicate the profile and distribute it to students as needed.)

4. Samples of various lumber species and qualities

   (NOTE: Sample chips are available from most lumber companies.)

5. Samples of lumber that show different grades, sawing methods, drying methods, and surface finishes

6. Samples of paneling, trim, and molding

B. Provide students with objective sheet.

C. Discuss unit and specific objectives, explaining the importance of being able to identify different species and grades of wood.

D. Provide students with information and assignment sheets.

E. Discuss information and assignment sheets.

   1. Use Information Sheet, Section I, to discuss terms associated with lumber.

      - Show students examples to illustrate appropriate terms.

   2. Use Information Sheet, Section II, to discuss characteristics to consider in using lumber.

      - Show Transparency #1 to illustrate clear cutting.

SUGGESTED ACTIVITIES

- Use pieces of lumber to point out each of the characteristics listed.

3. Use Information Sheet, Sections III and IV, to discuss the uses of common hardwoods and softwoods.

   - Provide students with a set of wood chips so that they may familiarize themselves with the different wood types.

   - Make a game of identifying different woods. Lay out the wood chips at different stations and have students identify them. After they have identified the types of wood, have students list as many uses as possible for each type. This game could also be set up competitively, with the students divided into two teams.

   - Take a field trip to a forest and allow students to make a tally of each of the different types of wood in the forest.

   - Take students to a lumberyard and then to a fine furniture store so that they can compare unfinished and finished woods and see some of their uses.

   - Have students survey their homes and list all the different types of wood and their uses.

4. Use Information Sheet, Section V, to discuss common defects in lumber.

   - Show students actual examples of each defect.

   - Lay out samples of lumber containing defects, and have students identify the type of defect in each.

5. Use Information Sheet, Sections VI through X to discuss the different grades and grading systems for hardwood, softwood, and plywood.

   - Provide students with copies of Supplements #1 and #2 to use as future reference.

   - Take students on a field trip to a lumber mill or lumberyard so that they can see how lumber is graded.

   - Lay out various grades of lumber, and have students identify the grade of each piece.

6. Use Information Sheet, Section XI, to discuss types of plywood core construction.

   - Show students samples of each type of core construction.

7. Use Information Sheet, Sections XII and XIII, to discuss actual and nominal sizes of softwood and hardwood lumber.

   - Make a set of flashcards and have students work in teams, giving actual for nominal sizes.

SUGGESTED ACTIVITIES

8. Use Information Sheet, Sections XIV through XVII, to discuss softwoods and hardwoods used in paneling and to discuss various types and uses of trim and molding.

   - Show students samples of the different types of paneling, trim, and molding.
   - Have students survey their homes and list all of the types of trim, molding, and paneling used.
   - Lay out samples of the types of trim and molding listed in Section XVII. Have the students identify each type.

9. Use Information Sheet, Sections XVIII through XXI to discuss units of measure for nails and lumber, computing lumber quantities, and writing a lumber requisition.

   - Show Transparencies #2 and #3 when discussing nails.
   - Show students samples of actual lumber requisitions.
   - Have students practice computing lumber quantities by completing Assignment Sheet #1.
   - Have students write their own lumber requisition by completing Assignment Sheet #2. Then have them follow through by role-playing, calling in their orders to you or to a fellow student.

F. Review all information.

G. Give test.

H. Critique test and discuss in class.

I. Reteach and retest if necessary.

J. Complete appropriate section of competency profiles.

III. Unit reference

Hendrix, Laborn J. "Bud." *Fundamentals of Carpentry.* Stillwater, Oklahoma: State Department of Vocational and Technical Education/Curriculum and Instructional Materials Center and The Associated General Contractors of America, 1985.

CARPENTRY MATERIALS
UNIT I

SUPPLEMENT #1 — LUMBER GRADING

Boards		
Appearance grades		
Selects	B and better C select D select	Selects are used for walls, ceilings, trim, and other areas where appearance is important but the use of hardwood is not desirable because of cost or other considerations.
Finish	Superior Prime E	
Paneling	Clear (any select or finish grade) No. 2 common (selected for knotty paneling) No. 3 common (selected for knotty paneling)	
Siding (bevel, bungalow)	Superior Prime	
Boards, sheathing	No. 1 common No. 2 common No. 3 common No. 4 common	Common boards are used for shelving, decking, window trim, and other applications where appearance is not critical, or where on-site selection and cutting is practical when appearance is a consideration.
Alternate board grades	Select merchantable Construction Standard Utility	
Dimension Lumber		
Light framing 2" to 4" thick 2" to 12" wide	Construction Standard Utility Economy	Light-framing lumber is used where great strength is *not* required, such as for studs, plates, and sills.
Studs 2" to 4" thick 2" to 4" wide	Stud Economy stud	Suitable for all stud uses, including load-bearing walls, this optional, all-purpose grade includes lumber up to 10 feet in length.
Structural light framing 2" to 4" thick 2" to 4" wide	Select structural No. 1 No. 2 (standard) No. 3 (utility) Economy	Structural lumber is used for light-framing and forming where greater bending strength is required. Typical uses include trusses, concrete pier wall forms.
Structural joists and planks 2" to 4" thick 6" and wider	Select structural No. 1 No. 2 (standard) No. 3 (utility) Economy	Suitable for joists, rafters, and general framing, these grades include lumber at least 6 inches wide.
Timbers		
Timbers	Select structural No. 1 No. 2 (No. 1 mining) No. 3 (No. 2 mining)	Timbers are used for stringers, beams, posts, and other support members.

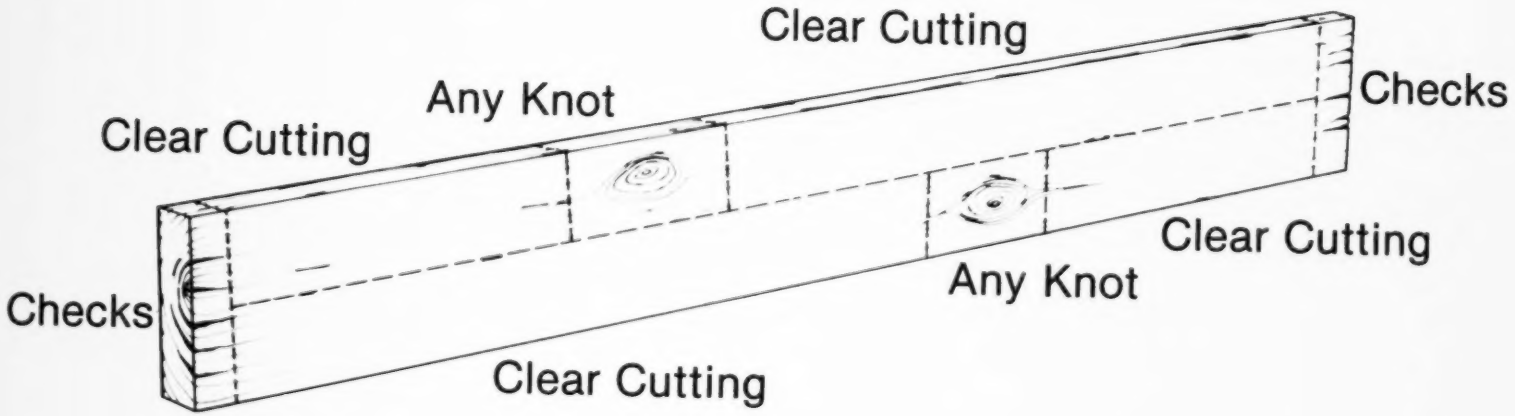
CARPENTRY MATERIALS
UNIT I

SUPPLEMENT #2 — PLYWOOD GRADES AND GRADE TRADEMARKS

Grade	Description	Grade trademark	Veneer grade	
			Faces	Inner plys
B-B Plyform, Class I and II** DFPA	Specifically manufactured for concrete forms; many reuses; smooth, solid surfaces; edge-sealed; and mill-oiled unless otherwise specified.	B-B PLYFORM CLASS I EXTERIOR DFPA	B	C
High-density overlaid Plyform, Class I and II** DFPA	Hard, semiopaque resin-fiber overlay, heat-fused to panel faces. Smooth surface resists abrasion. Up to two hundred reuses. Edge-sealed. Light oiling recommended between pours.	HDO · PLYFORM I · EXT · DFPA · PS 1-66	B	C Plugged
Structural I Plyform** DFPA	Especially designed for engineered applications; all Group 1 species; stronger and stiffer than Plyform, Classes I and II. Recommended for high pressures where face grain is parallel to supports. Also available with high-density overlay faces.	STRUCTURAL I B-B PLYFORM CLASS I EXTERIOR DFPA	B	C or C Plugged
Special overlays, proprietary panels, and medium-density overlaid plywood specifically designed for concrete forming**	Produce a smooth, uniform concrete surface. Generally mill-treated with form-release agent. Check with manufacturer for design treatment recommendations for greatest number of reuses.	—	—	—

*Commonly available in 5/8-inch and 3/4-inch panel thicknesses (4′ × 8′ size).
**Check dealer for availability in your area.

Clear Cutting



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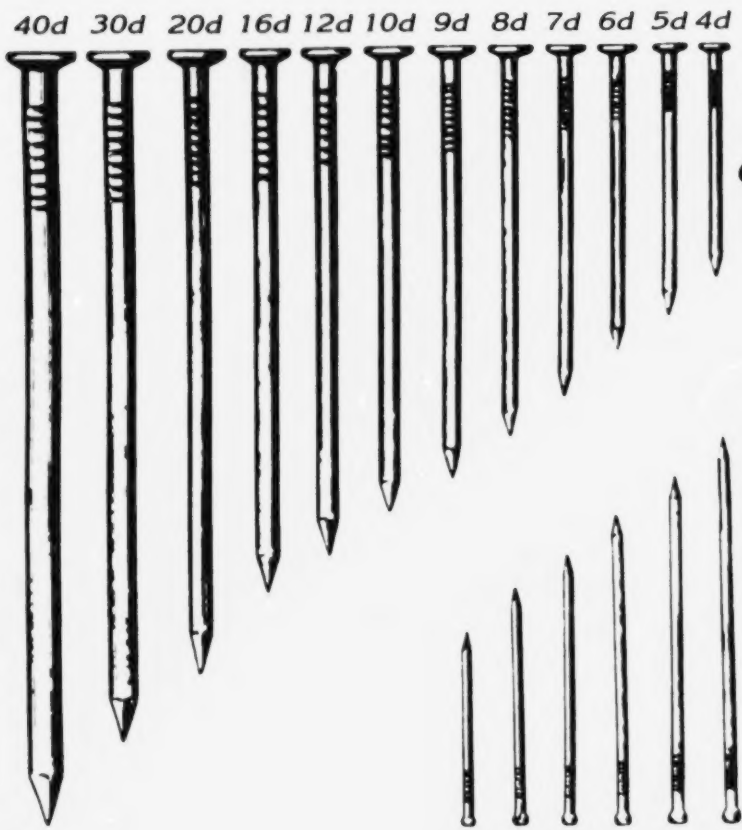
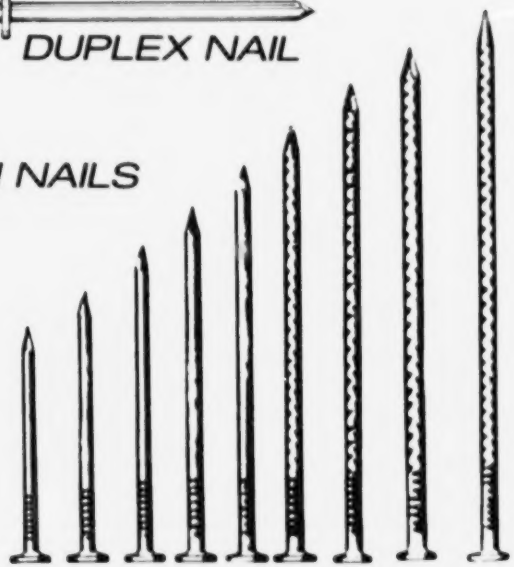
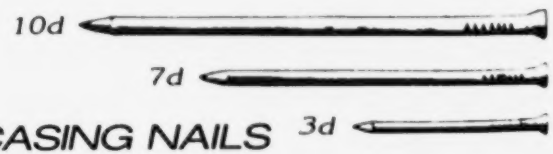
Nails


40d 30d 20d 16d 12d 10d 9d 8d 7d 6d 5d 4d
COMMON NAILS

DUPLEX NAIL


4d 5d 6d 7d 8d 9d 10d 12d 16d
BOX NAILS: SMOOTH, BARBED

3d 4d 5d 6d 7d 8d 9d
FINISHING NAILS


10d
7d
CASING NAILS
3d

Lengths of Nails by Pennyweight

Pennyweight	Length in inches for common, box, and finish nails
2d	1
3d	1 1/4
4d	1 1/2
5d	1 3/4
6d*	2
7d	2 1/4
8d*	2 1/2
9d	2 3/4
10d	3
12d	3 1/4
16d*	3 1/2
20d*	4

* Sizes most often used in construction

INFORMATION SHEET

B. Base shoe

FIGURE 19

1/2" x 3/4"

C. Cap molding (cap strip)

FIGURE 20

13/16" x 2 1/8"

D. Casing

FIGURE 21

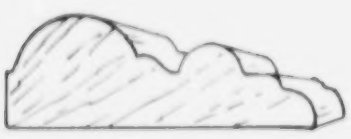
5/8" x 2 1/4"

FIGURE 22

5/8" x 2 1/4"

E. Chair rail

FIGURE 23



13/16" x 2 1/8"

F. Corner

1. Inside

FIGURE 24

3/4" x 3/4"

2. Outside

FIGURE 25

3/4" x 3/4"

Figures 19-25 used with permission of Southwest Moulding Company, Dallas, Texas.

CARPENTRY MATERIALS
UNIT I

INFORMATION SHEET

I. Terms and definitions

A. **Lumber** — Any material, such as boards, planks, or beams, cut from timber to a size and form suitable for marketing

B. **Lumber grades** — Standards established by the National Grading Rule Committee and the National Hardwood Lumber Association to ensure quality lumber

C. **Hardwood** — Wood produced from any of the groups of trees that have broad leaves, in contrast to conifers or needle-bearing trees

(NOTE: The term *hardwood* has no reference to the actual hardness of the wood.)

D. **Softwood** — Wood produced from any needle- or cone-bearing trees

(NOTE: The term *softwood* has no reference to the actual softness of the wood.)

E. **Plywood** — Fabricated wood product constructed of three or more layers (plies) of veneer joined with glue; the grain of each layer is usually at right angles to the grain of adjacent layers

EXAMPLES: Softwood — Face, back, and core plies may be edge-grained; crossband plies may be flat-grained.

Hardwood — Face, back, and core plies may be quarter-sawed; crossband plies may be plain-sawed.

F. **Pulpwood** — Wood ground up to make paper

G. **Heartwood** — Central part of tree trunk between pith and sapwood, consisting of dark, mature wood in which little further color change will occur

H. **Sapwood** — Light-colored wood growing between heartwood and bark

I. **Veneer** — Thin layer or sheet of wood glued to another base material

J. **Core** — Inner layers or fillers in plywood

K. **Surfaced wood** — Wood that has been dressed by planing to attain a smooth surface and uniform size

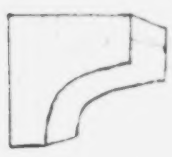
L. **Kiln-dried** — Dried in a heated enclosure

M. **Clear cutting** — Process of removing waste from boards

INFORMATION SHEET

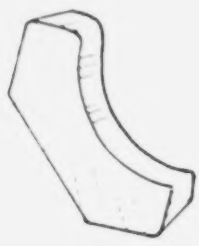
G. Cove

FIGURE 26



3/4" x 7/8"

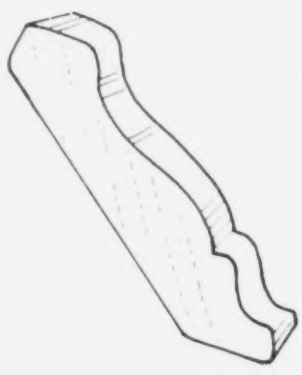
FIGURE 27



9/16" x 1 3/4"

H. Crown

FIGURE 28



9/16" x 2 3/4"

I. Quarter round

FIGURE 29

1/2" x 1/2"

FIGURE 30

3/4" x 3/4"

Figures 26-30 used with permission of Southwest Moulding Company, Dallas, Texas.

INFORMATION SHEET

II. Characteristics considered in using lumber

A. Kind of wood

(NOTE: Woods are classified as hard or soft, but that classification has more to do with the type of tree than the actual hardness of the wood. A builder may want to use a particular species of wood—such as redwood, cedar, or yellow pine—for a specific purpose based on the appearance or other characteristics of that type of wood.)

B. Grade

(NOTE: Lumber is graded based on its strength, appearance, number of defects, and other factors. Methods of grading are outlined by the American Lumber Standards Committee, and then detailed lists of grades and standards are developed by the various lumber producers' associations, such as Southern Pine Inspection Bureau, California Redwood Association, Western Wood Products Association, and others. Hardwood grades are regulated by the National Hardwood Lumber Association.)

C. Size

(NOTE: Lumber products come in standard sizes based on width, thickness, and length. Size may be *actual* or *nominal*. Nominal size is the size of the material before final processing and tends to be larger than the actual size after drying and shaping.)

D. Sawing method

(NOTE: Most trees are sawed so that the growth rings form an angle of less than 45 degrees with the surface of the boards produced. Such lumber is called *flat-grained* in softwoods or *plain-sawed* in hardwoods. Wood that is cut with the growth rings at an angle greater than 45 degrees is called *edge-grained* in softwoods and *quarter-sawed* in hardwoods. See Figures 1 and 2.)

EXAMPLES:

FIGURE 1

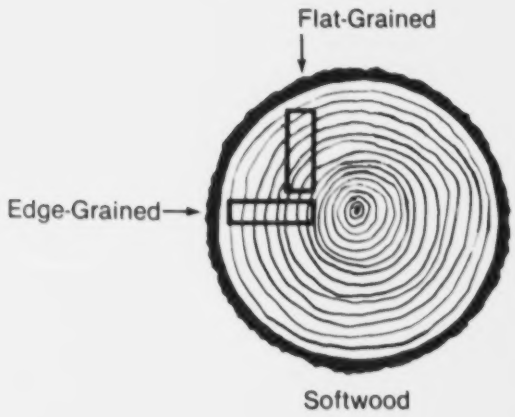
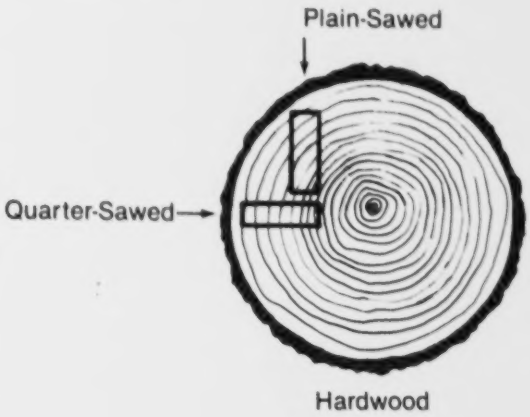


FIGURE 2



INFORMATION SHEET

E. Drying method

(NOTE: Lumber is dried to reduce its weight, to decrease shrinkage, and to improve usability. A number of considerations go into determining the correct moisture content for lumber. Generally, all the carpenter need understand is that green lumber—that is, lumber that has not been dried and with a moisture content of over 20 percent—will shrink more than air-dried or kiln-dried lumber.)

F. Surface finish

(NOTE: Lumber producers plane wood to give a smooth finish to one or more surfaces for specific purposes. Lumber may be rough, with no finished surfaces; smooth-one-side [S1S], with one wide surface planed; smooth-two-sides [S2S] with both wide surfaces planed; or smooth-four-sides [S4S] with all surfaces planed.)

III. Common softwoods and their uses

A. **Aromatic red cedar and incense cedar** — Chests, closet linings, pencils, fence posts, furniture, small-boat construction, novelties, paneling, interior and exterior trim, decking, greenhouse sashes and trays, railway crossties

B. **Western red cedar** — Shingles and shakes, lumber, poles, posts, piles, exterior siding, ship and boat building

C. **Bald and pecky cypress** — Millwork, planing-mill products, tanks, silos, exterior and interior trim, small boats, siding and shingles, boxes and crates, soundproof and rustic paneling, greenhouse benches

(NOTE: The pitted holes in pecky cypress make it a good material for soundproof paneling.)

D. **Douglas and white fir** — Construction lumber, plywood, veneers, planing-mill products, timbers, crossties, tanks, silos, trim, moldings, cabinets, flooring, doors, sashes

(NOTE: Douglas fir is one of our most valuable timber trees.)

E. **Western hemlock** — Millwork products such as doors and windows, utility lumber, plywood, cabinets, trim

F. **Larch** — Utility lumber, plywood, veneers, planing-mill products, crossties, trim, moldings, cabinets, flooring

G. **Ponderosa, white, and yellow pine** — Planing-mill products, cabinets, trim, molding, plywood, paneling, door panels, subflooring, sheathing, shelving, pattern lumber, models and novelties, boxes, crates, pulpwood, pallets, utility lumber

(NOTE: The pines are probably the most valuable group of timber trees in the world. They not only supply wood and pulp, but also supply natural resins including spirits of turpentine, resin, tar, and pitch.)

INFORMATION SHEET

H. **Redwood** — Planing-mill products, wood pipe, tanks, silos, beekeeper supplies, caskets, flumes, water towers, bridge timbers, trestles, pattern lumber, furniture, exterior siding and trim, exterior ornamentation, greenhouses, fences, plywood, paneling

(NOTE: Redwood is one of nature's outstanding wonders: Redwood trees can be destroyed by fire or felled by man or storm, but there has never been an observed case of a redwood dying from natural causes.)

I. **Sitka, Engelman, white, red, and black spruce** — General construction, wooden parts for aircraft, planing-mill products, plywood, cabinets, organ pipes, sounding boards for musical instruments, canoe paddles, ladder rails, decking, posts, crates, pulpwood

IV. Common hardwoods and their uses

A. **Alder or red alder (fruitwood)** — Utility furniture, cabinets, furniture frames, low-cost substitute for cherry

B. **Northern brown ash** — Furniture, cabinets, fixtures, trim, plywood

C. **Southern white ash** — Handles, woodenware, ball bats, implements, furniture, fixtures, cabinets, plywood, plywood edging, cabinet-door moldings

D. **Basswood** — Boxes, crates, planing-mill products, woodenware, moldings, picture frames, blind slats, luggage, musical instruments, matches, toys

E. **Beech** — Boxes, crates, planing-mill products, flooring, furniture, agricultural implements, handles, brush blocks, laundry appliances, fixtures

(NOTE: Beech is a sturdy, general-purpose hardwood and is an excellent alternate for birch or hard maple.)

F. **Northern birch** — Planing-mill products, interior finish, trim, cabinets, furniture, plywood, veneers, shuttles, bobbins, musical instruments, dowel pins, dowel rods, screwhole buttons and plugs

G. **Butternut** — Furniture, interior finish, paneling, trim in boats, novelty pieces, crow and duck calls

(NOTE: It is said that butternut is unexcelled for crow and duck calls.)

H. **Cherry** — Fine furniture and cabinet work, plywood, paneling, veneers, screwhole buttons and plugs

I. **Cottonwood** — Vehicle-body construction, stair risers, general cabinet work, boxes, crates

J. **American elm** — Plywood, burl veneers, inexpensive furniture and fixtures

K. **Sap gum and selected red gum** — Furniture, millwork, cabinets, plywood, veneers, plywood core stock, boxes, crates, crating-grade plywood, miscellaneous utility purposes

INFORMATION SHEET

L. **Genuine mahogany** — Fine furniture, fixtures, cabinets, trim, boat work, decorative trim

(NOTE: Mahogany is internationally renowned for its extraordinary combination of beauty and utility and is regarded by many as the premier cabinet wood of the world.)

M. **Philippine mahogany** — Furniture, fixtures, cabinets, paneling, veneers, plywood, boats, water skis, plywood edging, screwhole buttons and plugs, flooring, trim, exterior siding

N. **Hard maple** — Millwork, flooring, furniture, handles, agricultural implements, shuttles, boxes, cutting surfaces, bakery paddles, inlays and overlays

(NOTE: Hard maple is one of the world's greatest general-purpose hardwoods.)

O. **Red oak** — Furniture, interior finish, flooring, veneers, railroad ties, agricultural implements, heavy construction, timbers, truck flooring, plywood, plywood edging, cabinet and furniture pulls and handles, screwhole buttons and plugs, dowel rods

P. **White oak** — Furniture, interior finish, flooring, plywood, veneers, agricultural implements, structural parts of boats and ships, fixtures, heavy construction, railroad cars, timbers, tight cooperage

Q. **Pecan and hickory**— Tool handles for striking and lifting, interior and exterior furniture, plywood, paneling

(NOTE: Pecan and hickory are so closely related that a National Hardwood Lumber Association [NHLA] inspector does not make any distinction between them.)

R. **Persimmon** — Recognized standard for golf-club heads, shuttles, bobbins, plane stock, decorative veneers

S. **Yellow poplar** — Millwork, boxes, crates, structural parts of furniture, plywood core stock, vehicles, musical instruments, trim, fixtures, siding; concrete tools such as floats, darbies, and bull floats

T. **American sycamore** — Interior finish, cabinet work, plywood, interior furniture parts such as drawer slides

(NOTE: Sycamore is the largest hardwood tree in the United States.)

U. **American or black walnut** — Home and office furniture, radio and television cabinets, interior finish, paneling, veneers, plywood, plywood edging, musical instruments, commercial fixtures, gunstocks, caskets, sewing-machine cabinets, flooring, airplane propellers, clocks, carvings, trim and moldings, screwhole buttons and plugs, dowel rods

INFORMATION SHEET

V. Common defects in lumber

A. Warps (Figures 3-6)

1. Crook

FIGURE 3

2. Bow

FIGURE 4

3. Cup

FIGURE 5

4. Twist or wind

FIGURE 6

INFORMATION SHEET

B. Checks (Figure 7)

FIGURE 7

C. Knots (Figures 8-12)

1. Intergrown

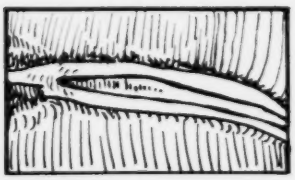
FIGURE 8

2. Encased

FIGURE 9

3. Spike

FIGURE 10

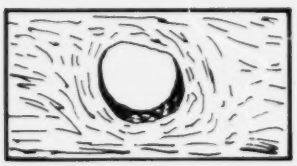


4. Decayed

FIGURE 11

5. Knothole

FIGURE 12



INFORMATION SHEET

VI. Grading of softwood lumber (Table 1)

(NOTE: Softwood lumber is used in shops and factories for shaped wood such as trim and molding and for on-site construction. Softwood lumber used in on-site construction is classed according to its size. *Boards* are 1 to 1½ inches thick and 2 inches or more wide. *Dimension lumber* is 2 to 5 inches thick and 2 inches or more wide. *Timbers* are 5 inches or more thick and 5 inches or more wide. Grades in this table are shown in descending order of quality, beginning with the best and moving to the least.)

TABLE 1

Type	Grade
Boards	
Select	B and better
	C select
	D select
Common	No. 1 common
	No. 2 common
	No. 3 common
	No. 4 common
Dimension lumber	
Light-framing	Construction
	Standard
	Utility
	Economy
Structural	Select structural
	No. 1
	No. 2
	No. 3
	Economy
Timbers	Select structural
	No. 1
	No. 2 (No. 1 Mining)

VII. Standard hardwood lumber grades

A. First and second (FAS)

(NOTE: The best grade yields about 85 to 90 percent clear cuttings. Most boards are a minimum of 6 inches wide and 8 inches long. FAS lumber is graded from the poorest side.)

INFORMATION SHEET

B. First and second one face and better (FAS 1 side and better)

(NOTE: These boards are subject to the same grading rules as FAS boards, except the board is graded from the best side.)

C. Selects and better

(NOTE: These boards are subject to the same grading rules as FAS 1 side and better, except the minimum allowable width is 4 inches.)

D. Selects

(NOTE: These boards are a minimum of 4 inches wide and 6 feet long. Better side grades FAS; reverse side grades No. 1 Common. Short and narrow boards are usually clear.)

E. No. 1 common (thrift)

(NOTE: These boards are a minimum of 3 inches wide and 4 feet long. This grade yields over two-thirds clear cuttings and contains less sap than clear grades. Stock is generally long with average widths.)

VIII. Descriptions of letters designating veneers used in softwood plywood

(NOTE: Softwood plywoods are graded by their face veneers, using a system of letters to show the quality of the veneers. Each face is graded, and the plywood is then designated by the letter grades of the two face veneers, such as A-B, A-D, or C-D.)

A. **N** — Intended for smooth surface, natural finish; select heartwood or all sapwood free from all open defects; may contain a few repairs if well-matched

B. **A** — Smooth, paintable, well-jointed; permits more than eighteen neatly made boat, sled, or router-type repairs parallel to grain

C. **B** — Relatively smooth; permits circular repair plugs and small tight knots to 1 inch; wood or synthetic patching material may be used; some minor splits are permitted

D. **C** — Tight knots to 1½ inches; permits knotholes to 1 inch and some to 1½ inches if total width is within specified limits; synthetic or wood repairs are permitted; limited splits are allowed

E. **C (plugged)** — Improved C veneer with splits limited to ⅛-inch wide and knotholes and borer holes limited to ¼" × ½"; synthetic repairs are permitted

F. **D** — Permits knots and knotholes to 2½ inches in width and ½ inch larger under certain specified limits; limited splits are permitted

INFORMATION SHEET

IX. Standard softwood plywood grades (Table 2)

(NOTE: Softwood plywoods are classed as interior [INT] or exterior [EXT]. Interior plywoods are made with a moisture-resistant glue, while exterior plywoods are made with a waterproof glue.)

TABLE 2

Standard softwood plywood grades (by face veneer)

Interior	Exterior
A-A	A-A
A-B	A-B
A-D	A-C
B-B	B-B
B-D	B-C
C-D	C-D
APA Plyform	B-B Plyform
	HDO Plyform

X. Descriptions of standard hardwood plywood grades

(NOTE: The outer plies of plywood are called the *face* and *back*, the next plies or layers are called *crossbands*, and the inside plies or the centers are called *cores*.)

A. **A** — Premium

B. **A1** — Premium one side, sound back; back has light, uniform color and grain; can be mismatched

C. **A2** — Premium one side, sound back; back is free of open defects; can be mismatched and of different species

D. **G1S** — Good one side, reject back; back has knotholes

E. **G2S** — Good both sides

F. **Craft shop** — Sound utility face and back, reasonably well matched in color

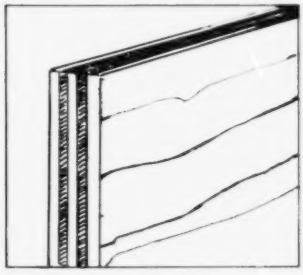
G. **Shop utility** — Sound face; American-made unless specified otherwise; all grades with softwood core may have small cracks in core where individual pieces of veneer edge do not meet perfectly

INFORMATION SHEET

XI. Types of plywood core construction (Figures 13-16)

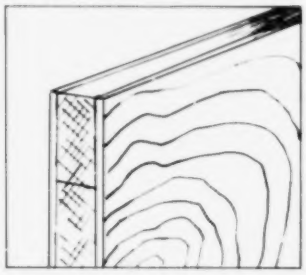
A. Veneer core

FIGURE 13



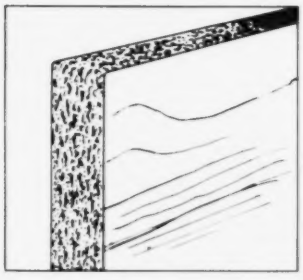
B. Lumber core

FIGURE 14



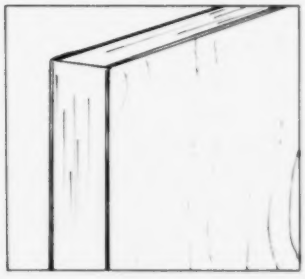
C. Particle-board core

FIGURE 15



D. Fiberboard core

FIGURE 16



XII. Nominal and actual softwood lumber sizes (See Table 3)

(NOTE: The sizes given in Table 2 are the most common widths and thicknesses of softwood lumber. Standard lengths come in 2-foot increments beginning with 8 feet and going up to 24 feet—that is, 8', 10', 12', 14', 16', 18', 20', 22', and 24'. Most suppliers can special-order lengths over 24 feet. Length is generally an actual measurement.)

TABLE 3

Nominal and actual softwood lumber sizes

Nominal (rough)	Actual (S4S)
1" x 4"	3/4" x 3 1/2"
1" x 6"	3/4" x 5 1/2"
1" x 8"	3/4" x 7 1/4"
1" x 10"	3/4" x 9 1/4"
1" x 12"	3/4" x 11 1/4"
2" x 4"	1 1/2" x 3 1/2"
2" x 6"	1 1/2" x 5 1/2"
2" x 8"	1 1/2" x 7 1/4"
2" x 10"	1 1/2" x 9 1/4"
2" x 12"	1 1/2" x 11 1/4
4" x 4"	3 1/2" x 3 1/2"
4" x 6"	3 1/2" x 5 1/2"

XIII. Nominal and actual hardwood lumber sizes (Table 4)

TABLE 4

Nominal and actual hardwood lumber sizes

Nominal (rough)	Actual (S2S) plain	Actual (S2S) quartered
1/2"	5/16"	5/16"
5/8"	7/16"	7/16"
3/4"	9/16"	9/16"
1"	25/32"	25/32"
1 1/4"	1 1/16"	1 1/32"
1 1/2"	1 5/16"	1 9/32"
2"	1 3/4"	1 11/16"
2 1/2"	2 1/4"	2 1/4"
3"	2 3/4"	2 3/4"
4"	3 3/4"	3 3/4"

INFORMATION SHEET

XIV. Solid softwoods used for paneling

A. Cedar
B. Cypress
C. Hemlock
D. Pine
E. Redwood
F. Spruce

XV. Solid hardwoods used for paneling

A. Ash
B. Cherry
C. Chestnut
D. Mahogany
E. Oak
F. Pecan and hickory
G. Poplar
H. Sycamore
I. Walnut

XVI. Types of wood used for trim and moldings

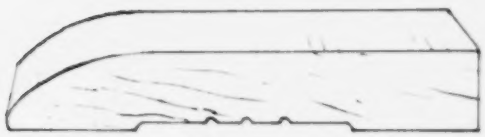
A. Ash
B. Basswood
C. Birch
D. Cypress
E. Mahogany
F. Oak
G. Pecan and hickory
H. Redwood
I. Walnut
J. White pine

XVII. Types and sizes of trim and moldings (Figures 17-34)

(NOTE: Trim is the finish material in a building, such as that applied around window and door openings or at the floor and ceiling of rooms.)

A. Base

FIGURE 17



1/2" x 3 1/8"

FIGURE 18

1/2" x 3"

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INFORMATION SHEET

J. Stop

FIGURE 31

3/8" x 1 3/8"

FIGURE 32

7/16" x 1 3/8"

K. T-astragal

FIGURE 33

1 3/4" x 7"

L. Wainscot cap or batten

FIGURE 34

9/16" x 2 1/4"

Figures 31-34 used with permission of Southwest Moulding Company, Dallas, Texas.

XVIII. Pennyweights of nails most often used in framing

(NOTE: The term *pennyweight* refers to the original weight, 22 1/2 grains, of a British silver penny. The penny was often abbreviated as *d*, after *denarius*, a small silver coin of ancient Rome. Today we use the term *pennyweight* to help size nails. A 6d nail, for instance, is equal to the weight of 6 silver pennies.)

A. 6d

B. 8d

C. 16d

D. 20d

INFORMATION SHEET

XIX. Units of measurement for various types of lumber

(NOTE: Lumber and certain related building materials come in basically three different units of measurement, each unit serving as the basis for pricing such materials. For example, 2×4 studs may cost 28 cents a board foot, plywood may cost 22 cents a square foot, and molding may sell for 18 cents a lineal foot. Also, lumber suppliers often give discounts for large-quantity orders. For instance, they may have one price per board foot and a lower price for 100 board feet [C bd ft] or per 1000 board feet [M bd ft].)

A. Board foot — Boards, dimension lumber, structural lumber, shop and factory lumber

B. Square foot — Plywood, particle board, drywall, sheathing, paneling, and certain hardwoods, milled boards, and specialty products such as flooring and ceiling tile

C. Lineal foot — Molding and trim

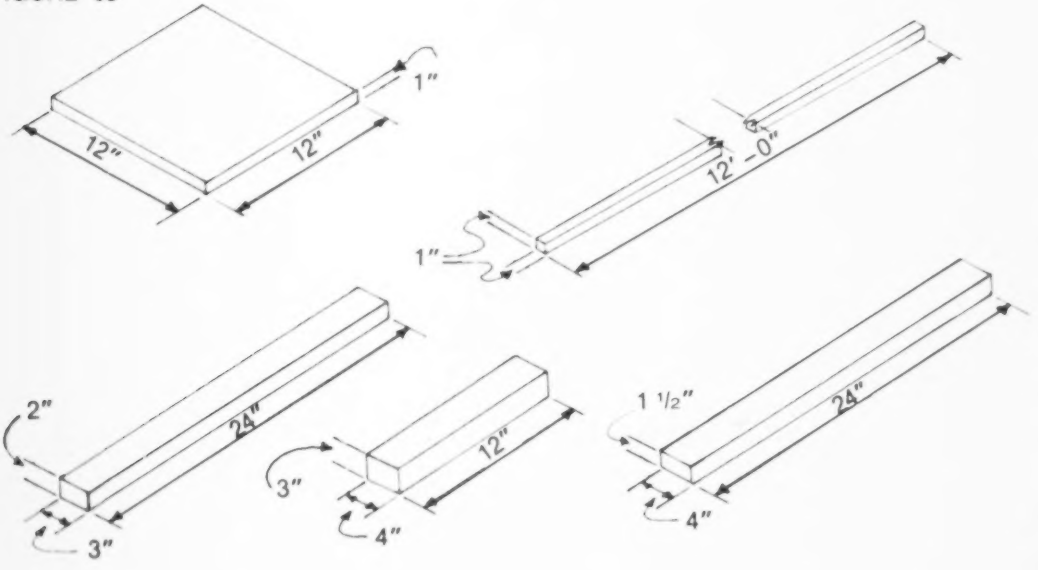
XX. Computing lumber quantities

A. Board feet

(NOTE: A board foot is 1 inch thick, 12 inches wide, and 1 foot long, or the equivalent. Each of the illustrations in Figure 35 is 1 board foot.)

EXAMPLE:

FIGURE 35



INFORMATION SHEET

1. Use formula $\frac{N \times T \times W \times L}{12}$, where N is number of pieces, T is thickness in inches, W is width in inches, and L is length in feet

2. Use nominal sizes in figuring board feet, except for lumber less than 1 inch thick, which is figured as 1 inch

   EXAMPLE: A piece 1/2" x 12" x 12" is considered to be 1 board foot.

3. Round fractional board feet to next full board foot

   EXAMPLES: 1 1/3 board feet is rounded to 2 board feet.

   1 1/2 board feet is rounded to 2 board feet.

   1 3/4 board feet is rounded to 2 board feet.

   1/2 board foot is rounded to 1 board foot.

B. Square feet

(NOTE: A square foot is an area equal to a square with 12-inch sides.)

1. Use the formula A = W x L, where A is area, W is width, and L is length

   EXAMPLE: To figure the square footage in a 4' x 8' sheet of plywood—

   A = W x L

   = 4' x 8'

   = 32 square feet

2. To find number of units needed (sheets, tiles, pieces, etc.), divide number of square feet to be covered by total square feet in one unit in which material is sold

3. Round fractional units to next whole unit in which material is sold

   EXAMPLE: To figure the plywood decking for a roof 20'-0" x 41'-0", use the formula A = W x L to get 820 total square feet to be covered. Divide this number by 32 (total square feet in one sheet of plywood) to get 25 5/8. Round this fractional unit to 26. Order twenty-six sheets of plywood to cover the area with no allowance for waste.

C. Lineal feet — Measure the distance in which the required product will be used

(NOTE: Molding and trim are sold in standard lengths of even-foot measurements. Most suppliers mix the lengths to get as close as possible to the amount ordered. For example, a supplier would probably ship 108 or 110 feet of base if an order called for 107 feet. The buyer is charged for the amount delivered, not for the amount ordered.)

INFORMATION SHEET

XXI. Writing a lumber requisition

A. Amount — Specify either as number of pieces or as quantity

EXAMPLES: 200 board feet of 1" × 12" white pine; 36 sheets of 1/2" C-D plywood; 150 feet of sanitary base

B. Size

(NOTE: When actual size of product is different from nominal size, use nominal size when ordering.)

1. For boards, dimension, and structural lumber, specify thickness, width, and length

2. For plywoods, paneling, and some other sheet products such as lumber core ash, specify thickness

3. For most trim and molding, specify thickness and width

C. Grade — Specify according to industry grading standards

D. Type of wood — Specify if a particular species is required

(NOTE: For most light framing, suppliers stock only one or two kinds of wood, such as Douglas fir or western hemlock. Often the order will not specify the species for such uses.)

E. Drying — Specify if moisture content is a concern

(NOTE: Most lumber is kiln-dried [KD], and most orders will not specify drying unless something other than KD is desired or if the desired moisture content is different from what is normally stocked for that type of lumber.)

F. Cut and surfacing — Specify if edge-grained or quarter-sawed cut is desired or if surface finishes other than what is normal for type of lumber are desired

G. Special requirements — Specify if special characteristics of the lumber are required, or if the supplier is to prepare the lumber in a special way (Table 5)

EXAMPLE:

TABLE 5

Special requirements

Amount	Size	Description
6	2" × 4" × 14'	Utility, fir, KD
31 sheets	1/2"	C-D, fir
10 sheets	5/8"	B-B, Plyform
110"	1/2" × 3 1/8"	#1 sanitary base, ash
200 bd ft	2" × 6"	Construction, redwood, hand select

CARPENTRY MATERIALS
UNIT I

ASSIGNMENT SHEET #1 — COMPUTE LUMBER QUANTITIES

NAME _____ SCORE _____

In order to write accurate lumber requisitions, a carpenter must be skilled in computing lumber quantities. Practice computing total board feet, square feet, and lineal feet by completing this assignment sheet. Refer to Information Sheet, Section XX if necessary.

PART I

Compute total board feet for each of the following problems. Round fractional board feet to the next full board foot. Write your answers in the spaces provided.

A. One common board 1" x 10" x 10' = _____

B. One select board 1" x 4" x 14' = _____

C. One piece of light-framing dimension lumber 2" x 6" x 8' = _____

D. One piece of structural dimension lumber 2" x 8" x 10' = _____

E. Two select boards 2" x 6" x 8' = _____

F. Five common boards 1" x 8" x 8' = _____

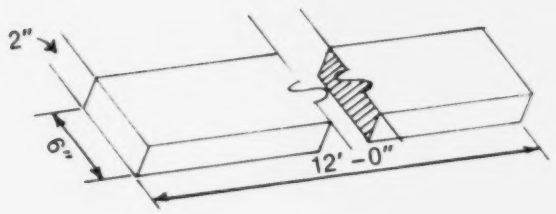
G. Ten pieces of structural dimension lumber 4" x 6" x 10' = _____

H. One piece of light-framing dimension lumber 2" x 4" x 18' = _____

I. One hundred timbers 5" x 12" x 24' = _____

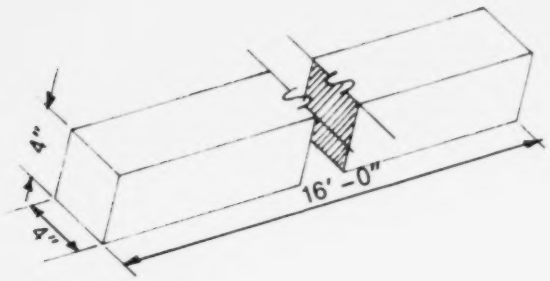
J. Thirty common boards at 1" x 2" x 6' = _____

K. Compute board feet for each of the pieces of lumber in the following illustrations.

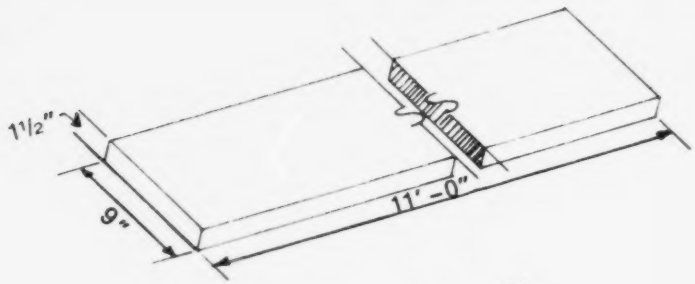


1. _____ board feet

ASSIGNMENT SHEET #1



2. _____ board feet



3. _____ board feet

PART II

Compute square feet and determine the number of sheets needed to cover each of the following surface areas with the material listed below them. Plywood comes in 32-square-foot sheets, gyplap in 16-square-foot sheets. Remember to round fractional sheets to the next whole sheet.

A. Area 11' – 6" x 9' – 10" = _____ square feet
(Gyplap)
_____ sheets

B. Area 24' – 0" x 13' – 0" = _____ square feet
(Plywood)
_____ sheets

C. Area 46' – 0" x 38' – 0" = _____ square feet
(Plywood)
_____ sheets

D. Area 15' – 0" x 18' – 0" = _____ square feet
(Plywood)
_____ sheets

ASSIGNMENT SHEET #1

E. Area 32′ –0″ x 12′ –0″ =_____ square feet
(Gyplap)

_____ sheets

PART III

Figure lineal feet for each of the following problems.

A. Eight pieces of base 12 feet long = _____ lineal feet

B. Forty-two pieces of molding 16 feet long = _____ lineal feet

C. Measure the base on the north and west walls of your shop or classroom. Write the number of lineal feet of molding or trim needed to cover this area.

Lineal feet of molding or trim = _____

CARPENTRY MATERIALS
UNIT I

ASSIGNMENT SHEET #2 — WRITE A LUMBER REQUISITION

NAME _____ SCORE _____

A carpenter must be sure that lumber is appropriate for its intended use. It must be the correct kind of wood, the most economical grade to suit the purpose, the right size; and it must be properly cut and dried. All of these characteristics, as well as the quantity required, must be specified when ordering lumber.

Use the form on the next page to write a requisition for the materials required for each situation described below. Refer to the information sheet or other texts for additional information, or consult with a local materials supplier. Answers and materials selected will vary. Be prepared to discuss your choices and your reasons for these choices.

A. Order the plywood required to deck a 2000-square-foot roof.

B. Order the material needed to build the decking for a rot-resistant deck, 10′ – 0″ × 14′ – 0″.

C. Order cove molding for two rooms 18′ × 12′ and for one room 22′ × 16′.

D. Order birch material for cabinet doors. You need enough for fifteen 12″ × 24″ doors.

E. Order a rot-resistant rough-surface material for use on the gable of a house. You need enough to cover 144 square feet.

F. Order studs for energy-efficient walls. You will need 146 studs 92 5/8 inches long.

G. Order material for 12-inch-deep wood shelves to be used in 6-foot-wide closets. You need enough for eight closets. There is one shelf per closet.

H. Order material for ceiling joists. The material needs to span a house 28′ – 0″ wide with a load-bearing wall at 14′ – 0″. You need enough material to have a joist every 16 inches for a run of 46′ – 0″. Allow the joists to overlap 24 inches at the load-bearing wall.

I. Order material to line a wardrobe closet to protect the clothing from mildew and moths. The material should have a pleasing appearance. You will need enough to cover 320 square feet.

J. Order material to lay the sole plate of a building built with 2×4 walls. The material should be treated. You will need enough to go around a 24′ – 0″ × 48′ – 0″ building.

ASSIGNMENT SHEET #2

Amount	Size	Description
A.		
B.		
C.		
D.		
E.		
F.		
G.		
H.		
I.		
J.		

CARPENTRY MATERIALS
UNIT I

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1

Part I

A. 9 board feet
B. 5 board feet
C. 8 board feet
D. 14 board feet
E. 16 board feet
F. 27 board feet
G. 200 board feet
H. 12 board feet
I. 12,000 board feet
J. 30 board feet
K. 1. 12 board feet
2. 22 board feet
3. 13 board feet

Part II

A. 113 square feet; 8 sheets
B. 312 square feet; 10 sheets
C. 1748 square feet; 55 sheets
D. 270 square feet; 9 sheets
E. 384 square feet; 24 sheets

Part III

A. 96 lineal feet
B. 672 lineal feet
C. Evaluated to the satisfaction of the instructor

Assignment Sheet #2

(NOTE: The answers given are typical orders for each situation and make no allowance for waste. However, your students may have different answers that are acceptable if they chose different materials or laid out the materials differently. Material selections may reflect various construction techniques or the availability of materials in your area. By discussing their choices and the reasons for those choices, your students will develop a greater understanding of lumber grades, dimensions, and applications.)

Amount	Size	Description
A. 63 sheets	4′ × 8′ × 1/2″	C-D plywood, EXT
B. 42	2″ × 4″ × 10′	Construction grade redwood, selected for minimum crown
C. 196 lineal feet	3/4″ × 7/8″	Ash cove molding
D. 1 sheet	4′ × 8′ × 3/4″	A1 birch, fibercore plywood
E. 144 board feet	1″ × 12″	#2 rough cedar
F. 146	2″ × 6″ × 92 5/8″	Utility studs
G. 4	1″ × 12″ × 12′	#2 white pine S2S
H. 72	2″ × 6″ × 16′	Utility, Douglas fir
I. 640 lineal feet	1″ × 6″	Tongue-and-groove cedar, select
J. 9	2″ × 4″ × 16′	Utility, Douglas fir, treated

CARPENTRY MATERIALS
UNIT I

TEST

NAME _____ SCORE _____

1. Match to their correct definitions terms associated with lumber. Write the correct numbers in the blanks.

_____a. Standards established by the National Grading Rule Committee and the National Hardwood Lumber Association to ensure quality lumber

_____b. Wood that has been dressed by planing to attain a smooth surface and uniform size

_____c. Dried in a heated enclosure

_____d. Process of removing waste from boards

_____e. Any material, such as boards, planks, or beams, cut from timber to a size and form suitable for marketing

_____f. Wood produced from any of the groups of trees that have broad leaves, in contrast to conifers or needle-bearing trees

_____g. Light-colored wood growing between heartwood and bark

_____h. Inner layers or fillers in plywood

_____i. Fabricated wood product constructed of three or more layers (plies) of veneer joined with glue; the grain of each layer is usually at right angles to the grain of adjacent layers

_____j. Thin layer or sheet of wood glued to another base material

_____k. Wood ground up to make paper

_____l. Central part of tree trunk between pith and sapwood, consisting of dark, mature wood in which little further color change will occur

_____m. Wood produced from any needle- or cone-bearing trees

1. Surfaced wood
2. Veneer
3. Lumber
4. Kiln-dried
5. Lumber grades
6. Plywood
7. Pulpwood
8. Softwood
9. Clear cutting
10. Heartwood
11. Core
12. Hardwood
13. Sapwood

TEST

2. Select from the following list characteristics to consider in using lumber. Write an "X" in the blank before each correct answer.

_____a. Brand name

_____b. Sawing method

_____c. Grade

_____d. Drying method

_____e. Kind of wood

_____f. Price

_____g. Size

_____h. Core finish

_____i. Surface finish

3. Match common softwoods to their correct uses. Write the correct numbers in the blanks. Uses continue on the next page.

_____a. Chests, closet linings, pencils, fence posts, furniture, small-boat construction, novelties, paneling, interior and exterior trim, decking, greenhouse sashes and trays, railway crossties

_____b. Construction lumber, plywood, veneers, planing-mill products, timbers, crossties, tanks, silos, trim, moldings, cabinets, flooring, doors, sashes

_____c. Utility lumber, plywood, veneers, planing-mill products, crossties, trim, moldings, cabinets, flooring

_____d. Planing-mill products, wood pipe, tanks, silos, beekeeper supplies, caskets, flumes, water towers, bridge timbers, trestles, pattern lumber, furniture, exterior siding and trim, exterior ornamentation, greenhouses, fences, plywood, paneling

_____e. Millwork, planing-mill products, tanks, silos, exterior and interior trim, small boats, siding and shingles, boxes and crates, soundproof and rustic paneling, greenhouse benches

_____f. Millwork products such as doors and windows, utility lumber, plywood, cabinets, trim

1. Larch
2. Bald and pecky cypress
3. Sitka, Engelman, white, red, and black spruce
4. Douglas and white fir
5. Western hemlock
6. Aromatic red cedar and incense cedar
7. Ponderosa, white, and yellow pine
8. Redwood
9. Western red cedar

TEST

_____g. Planing-mill products, cabinets, trim, molding, plywood, paneling, door panels, subflooring, sheathing, shelving, pattern lumber, models and novelties, boxes, crates, pulpwood, pallets, utility lumber

_____h. General construction, wooden parts for aircraft, planing-mill products, plywood, cabinets, organ pipes, sounding boards for musical instruments, canoe paddles, ladder rails, decking, posts, crates, pulpwood

_____i. Shingles and shakes, lumber, poles, posts, piles, exterior siding, ship and boat building

4. Match common hardwoods to their correct uses. Write the correct numbers in the blanks.

Part one

_____a. Fine furniture and cabinet work, plywood, paneling, veneers, screwhole buttons and plugs

_____b. Boxes, crates, planing-mill products, woodenware, moldings, picture frames, blind slats, luggage, musical instruments, matches, toys

_____c. Plywood, burl veneers, inexpensive furniture and fixtures

_____d. Furniture, cabinets, fixtures, trim, plywood

_____e. Furniture, interior finish, paneling, trim in boats, novelty pieces, crow and duck calls

_____f. Utility furniture, cabinets, furniture frames, low-cost substitute for cherry

_____g. Vehicle-body construction, stair risers, general cabinet work, boxes, crates

_____h. Handles, woodenware, ball bats, implements, furniture, fixtures, cabinets, plywood, plywood edging, and cabinet-door moldings

_____i. Planing-mill products, interior finish, trim, cabinets, furniture, plywood, veneers, shuttles, bobbins, musical instruments, dowel pins, dowel rods, screwhole buttons and plugs

_____j. Boxes, crates, planing-mill products, flooring, furniture, agricultural implements, handles, brush blocks, laundry appliances, fixtures

1. Butternut
2. Cottonwood
3. Southern white ash
4. American elm
5. Northern brown ash
6. Northern birch
7. Basswood
8. Beech
9. Alder or red alder (fruitwood)
10. Cherry

TEST

Part two

_____a. Tool handles for striking and lifting, interior and exterior furniture, plywood, paneling

_____b. Furniture, interior finish, flooring, veneers, railroad ties, agricultural implements, heavy construction, timbers, truck flooring, plywood, plywood edging, cabinet and furniture pulls and handles, screwhole buttons and plugs, dowel rods

_____c. Recognized standard for golf-club heads, shuttles, bobbins, plane stock, decorative veneers

_____d. Fine furniture, fixtures, cabinets, trim, boat work, decorative trim

_____e. Furniture, millwork, cabinets, plywood, veneers, plywood core stock, boxes, crates, crating-grade plywood, miscellaneous utility purposes

_____f. Home and office furniture, radio and television cabinets, interior finish, paneling, veneers, plywood, plywood edging, musical instruments, commercial fixtures, gunstocks, caskets, sewing-machine cabinets, flooring, airplane propellers, clocks, carvings, trim and moldings, screwhole buttons and plugs, dowel rods

_____g. Interior finish, cabinet work, plywood, interior furniture parts such as drawer slides

_____h. Furniture, interior finish, flooring, plywood, veneers, agricultural implements, structural parts of boats and ships, fixtures, heavy construction, railroad cars, timbers, tight cooperage

_____i. Millwork, flooring, furniture, handles, agricultural implements, shuttles, boxes, cutting surfaces, bakery paddles, inlays and overlays

_____j. Furniture, fixtures, cabinets, paneling, veneers, plywood, boats, water skis, plywood edging, screwhole buttons and plugs, flooring, trim, exterior siding

_____k. Millwork, boxes, crates, structural parts of furniture, plywood core stock, vehicles, musical instruments, trim, fixtures, siding; concrete tools such as floats, darbies, and bull floats

1. Persimmon
2. American or black walnut
3. White oak
4. Pecan and hickory
5. Yellow poplar
6. Genuine mahogany
7. Hard maple
8. American sycamore
9. Red oak
10. Sap gum and selected red gum
11. Philippine mahogany

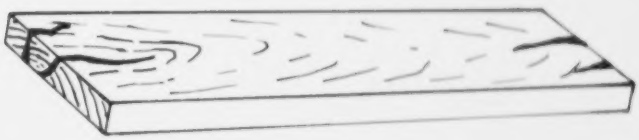
TEST

5. Identify common defects in the lumber illustrated. Write the correct names in the blanks. Illustrations continue on the next page.

Crook warp
Bow warp
Cup warp
Twist or wind warp

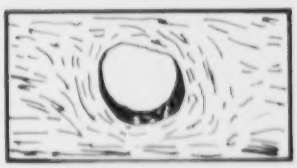
Checks
Intergrown knot
Encased knot

Spike knot
Decayed knot
Knothole

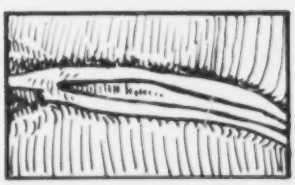


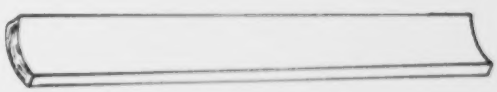
a. _____ b. _____

c. _____ d. _____



e. _____ f. _____





g. _____ h. _____

TEST

i. _____ j. _____

6. Match types of softwood lumber to their correct grades. Write the correct numbers in the blanks.

_____a. Construction
Standard
Utility
Economy

_____b. No. 1 common
No. 2 common
No. 3 common
No. 4 common

_____c. B and better
C select
D select

_____d. Select structural
No. 1
No. 2
No. 3
Economy

_____e. Select structural
No. 1
No. 2 (No. 1 Mining)

1. Timbers
2. Light-framing dimension lumber
3. Select boards
4. Structural-dimension lumber
5. Common boards

7. Select from the following list standard hardwood lumber grades. Write an "X" in the blank before each correct answer.

_____a. Selects

_____b. First and third (S4S)

_____c. No. 1 common (thrift)

_____d. First and second one face and better (FAS 1 side and better)

_____e. Premium (FAS, S2S)

_____f. Selects and better

_____g. First and second (FAS)

TEST

8. Match to their correct descriptions letters designating veneers used in softwood plywood. Write the correct numbers in the blanks.

_____a. Relatively smooth; permits circular repair plugs and small tight knots to 1 inch; wood or synthetic patching material may be used; some minor splits are permitted

_____b. Intended for smooth surface, natural finish; select heartwood or all sapwood free from all open defects; may contain a few repairs if well-matched

_____c. Permits knots and knotholes to 2½ inches in width and ½ inch larger under certain specified limits; limited splits are permitted

_____d. Improved C veneer with splits limited to ⅛-inch wide and knotholes and borer holes limited to ¼" × ½"; synthetic repairs are permitted

_____e. Smooth, paintable, well-jointed; permits more than eighteen neatly made boat, sled, or router-type repairs, parallel to grain

_____f. Tight knots to 1½ inches; permits knotholes to 1 inch and some to 1½ inches if total width is within specified limits; synthetic or wood repairs are permitted; limited splits are allowed

1. N
2. A
3. B
4. C
5. C (plugged)
6. D

9. Distinguish between standard interior and exterior softwood plywood grades by face veneer. Write an "I" in the blanks before interior grades, and an "E" in the blanks before exterior grades. Some blanks may contain more than one answer.

_____a. A-A

_____b. C-D

_____c. B-B Plyform

_____d. A-B

_____e. B-C

_____f. A-D

_____g. APA Plyform

_____h. A-C

_____i. B-D

_____j. HDO Plyform

_____k. B-B

TEST

10. Match standard hardwood plywood grades to their correct descriptions. Write the correct numbers in the blanks.

_____a. Good both sides

_____b. Sound face; American-made unless specified otherwise; all grades with softwood core may have small cracks in core where individual pieces of veneer edge do not meet perfectly

_____c. Premium

_____d. Premium one side, sound back; back is free of open defects; can be mismatched and of different species

_____e. Good one side, reject back; back has knotholes

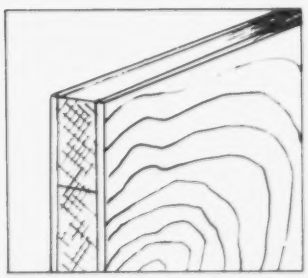
_____f. Premium one side, sound back; back has light, uniform color and grain; can be mismatched

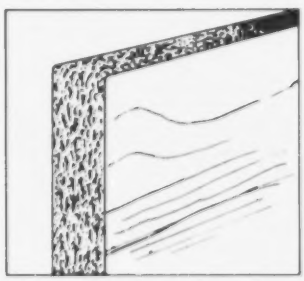
_____g. Sound utility face and back, reasonably well matched in color

1. A
2. A1
3. A2
4. G1S
5. G2S
6. Craft shop
7. Shop utility

11. Identify the following illustrations of types of plywood core construction. Write the correct names in the blanks. Illustrations continue on the next page.

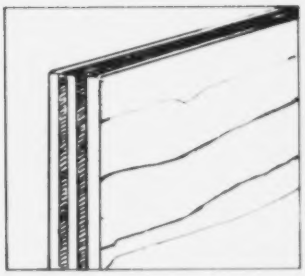
Veneer core
Lumber core
Particle-board core
Fiberboard core

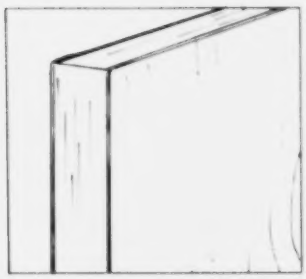




a. _____ b. _____

TEST





c. _____ d. _____

12. Write actual sizes for given nominal sizes of softwood lumber.

Actual (S4S)	Nominal (rough)
a. _____	1" x 4"
b. _____	1" x 6"
c. _____	1" x 12"
d. _____	2" x 4"
e. _____	2" x 6"
f. _____	2" x 8"
g. _____	2" x 10"
h. _____	4" x 6"

13. Write actual sizes for given nominal sizes of hardwood lumber.

Nominal (rough)	Actual (S2S) plain	Actual (S2S) quartered
1/2"	5/16"	a. _____
3/4"	b. _____	9/16"
1 1/4"	c. _____	1 1/32"
1 1/2"	d. _____	e. _____
3"	f. _____	2 3/4"
4"	3 3/4"	g. _____

TEST

14. Select from the following list solid softwoods used for paneling. Write an "X" in the blank before each correct answer.

_____a. Pine

_____b. Redwood

_____c. Spruce

_____d. Cedar

_____e. Basswood

_____f. Hemlock

_____g. Cypress

15. Select from the following list solid hardwoods used for paneling. Write an "X" in the blank before each correct answer.

_____a. Redwood

_____b. Cherry

_____c. Pecan and hickory

_____d. Chestnut

_____e. Sycamore

_____f. Walnut

_____g. Cypress

_____h. Ash

_____i. Mahogany

_____j. Oak

_____k. Ironwood

_____l. Poplar

16. Select from the following list types of woods used for trim and moldings. Write an "X" in the blank before each correct answer.

_____a. Hemlock

_____b. Basswood

_____c. Mahogany

_____d. Ash

_____e. Walnut

_____f. Buckeye

_____g. Cypress

_____h. Redwood

_____i. Maple

_____j. Pecan and hickory

_____k. Oak

_____l. Birch

_____m. White pine

_____n. Persimmon

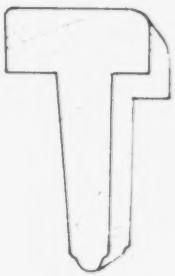
TEST

17. Identify the types of trim and moldings shown in the following illustrations. Write the correct names in the blanks. Illustrations continue on the next page. Some answers may be used more than once.

Base	**Inside corner**	**Quarter round**
Base shoe	**Outside corner**	**Stop**
Cap molding (cap strip)	**Cove**	**T-astragal**
Casing	**Crown**	**Wainscot cap or batten**
Chair rail		

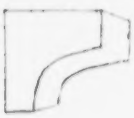
a. _____

b. _____



c. _____

d. _____



e. _____

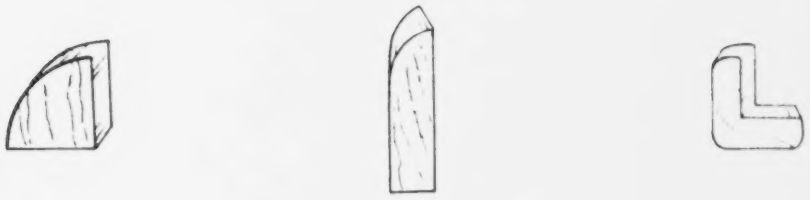
f. _____

g. _____

h. _____

i. _____

TEST



j. _____ k. _____ l. _____

m. _____ n. _____ o. _____

p. _____ q. _____ r. _____

18. Select from the following list pennyweights of nails most often used in framing. Write an "X" in the blank before the four most commonly used sizes.

___a. 4d	___c. 8d	___e. 12d	___g. 20d
___b. 6d	___d. 10d	___f. 16d	___h. 30d

19. Match types of lumber to their correct units of measure. Write the correct numbers in the blanks.

_____a. Plywood, particle board, drywall, sheathing, paneling, and certain hardwoods, milled boards, and specialty products such as flooring and ceiling tile

_____b. Molding and trim

_____c. Boards, dimension lumber, structural lumber, shop and factory lumber

1. Board foot
2. Square foot
3. Lineal foot

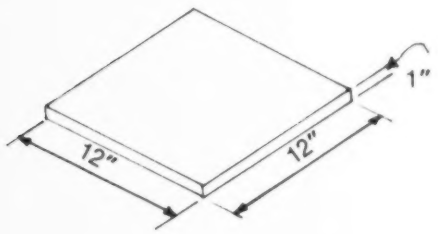
TEST

20. Compute the following quantities of lumber. Write your answers in the blanks.

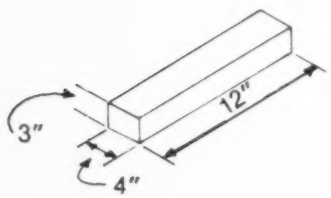
a. Compute total board feet for the following problems. Round fractional board feet to the next full board foot.

1) Two pieces of structural dimension lumber 2" × 6" × 10' = _____

2) Ten timbers 5" × 12" × 20' = _____



3) _____



4) _____

TEST

b. Compute square feet of the following surface areas, and then determine the number of plywood or gyplap sheets needed to cover each of the areas. Plywood sheets contain 32 square feet, and gyplap sheets contain 16 square feet.

1) Area 12′ – 0″ × 16′ – 0″ = _____ square feet
(Plywood)

_____ sheets

2) Area 24′ – 0″ × 32′ – 0″ = _____ square feet
(Gyplap)

_____ sheets

c. Compute lineal feet for each of the following problems.

1) Four pieces of chair railing 14 feet long = _____lineal feet

2) Thirty-six pieces of trim 8 feet long = _____ lineal feet

(NOTE: Test question 21 lists an assignment sheet. It is an important part of this test. If it has not been completed, check with your instructor.)

21. Write a lumber requisition.

CARPENTRY MATERIALS
UNIT I

ANSWERS TO TEST

1. a. 5
   b. 1
   c. 4
   d. 9
   e. 3
   f. 12
   g. 13
   h. 11
   i. 6
   j. 2
   k. 7
   l. 10
   m. 8

2. b, c, d, e, g, i

3. a. 6
   b. 4
   c. 1
   d. 8
   e. 2
   f. 5
   g. 7
   h. 3
   i. 9

4. **Part one**

   a. 10
   b. 7
   c. 4
   d. 5
   e. 1
   f. 9
   g. 2
   h. 3
   i. 6
   j. 8

   Part two

   a. 4
   b. 9
   c. 1
   d. 6
   e. 10
   f. 2
   g. 8
   h. 3
   i. 7
   j. 11
   k. 5

5. a. Checks
   b. Decayed knot
   c. Encased knot
   d. Bow warp
   e. Twist or wind warp
   f. Knothole
   g. Spike knot
   h. Cup warp
   i. Crook warp
   j. Intergrown knot

6. a. 2
   b. 5
   c. 3
   d. 4
   e. 1

7. a, c, d, f, g

8. a. 3
   b. 1
   c. 6
   d. 5
   e. 2
   f. 4

9. a. I, E
   b. I,E
   c. E
   d. I, E
   e. E
   f. I
   g. I
   h. E
   i. I
   j. E
   k. I,E

10. a. 5
    b. 7
    c. 1
    d. 3
    e. 4
    f. 2
    g. 6

11. a. Lumber core
    b. Particle-board core
    c. Veneer core
    d. Fiberboard core

ANSWERS TO TEST

12. a. 3/4" x 3 1/2"
    b. 3/4" x 5 1/2"
    c. 3/4" x 11 1/4"
    d. 1 1/2" x 3 1/2"
    e. 1 1/2" x 5 1/2"
    f. 1 1/2" x 7 1/4"
    g. 1 1/2" x 9 1/4"
    h. 3 1/2" x 5 1/2"

13. a. 5/16"
    b. 9/16"
    c. 1 1/16"
    d. 1 5/16"
    e. 1 9/32"
    f. 2 3/4"
    g. 3 3/4"

14. a, b, c, d, f, g

15. b, c, d, e, f, h, i, j, l

16. b, c, d, e, g, h, j, k, l, m

17. a. Crown
    b. Cove
    c. T-astragal
    d. Stop
    e. Cove
    f. Casing
    g. Base
    h. Chair rail
    i. Base
    j. Quarter round
    k. Stop
    l. Outside corner
    m. Base shoe
    n. Wainscot cap or batten
    o. Inside corner
    p. Casing
    q. Cap molding (cap strip)
    r. Quarter round

18. b,c,f,g

19. a. 2
    b. 3
    c. 1

20. a. 1) 20 board feet
    2) 1000 board feet
    3) 1 board foot
    4) 1 board foot

    b. 1) 192 square feet; 6 sheets
    2) 768 square feet; 48 sheets

    c. 1) 56 lineal feet
    2) 288 lineal feet

21. Evaluated to the satisfaction of the instructor

CARPENTRY TOOLS
UNIT II

UNIT OBJECTIVE

After completing this unit, the student should be able to identify hand tools and list rules for care and safe use of hand tools. The student will show this knowledge by completing job sheets and unit test with a minimum score of 80 percent.

SPECIFIC OBJECTIVES

After completing this unit, the student should be able to

1. Match terms associated with hand tools to their correct definitions.
2. State guidelines for care and safe use of hand tools.
3. Select from a list hand tools a beginning carpenter needs.
4. Match types of hammers to their correct uses.
5. Match types of handsaws to their correct uses.
6. Match types of squares to their correct uses.
7. Match types of planes to their correct uses.
8. Match types of measuring instruments to their correct uses.
9. Identify types of layout instruments.
10. Identify types of boring and drilling hand tools.
11. Identify types of screwdrivers.
12. Match types of pliers to their correct uses.
13. Identify types of wrenches.
14. Identify types of files.
15. Identify types of chisels.
16. Identify types of clamps.
17. Match types of miscellaneous hand tools to their correct uses.
18. State general safety rules pertaining to portable power tools.

OBJECTIVE SHEET

19. Select from a list general guidelines for proper care of portable power tools.
20. Select from a list portable power tools used by carpenters.
21. Distinguish among uses of portable power saws.
22. State rules for safe use of portable power saws.
23. Distinguish between use of a router and a trimmer.
24. State rules for safe use of routers and trimmers.
25. Distinguish among uses of portable drills, screwdrivers, and hammer drills.
26. State rules for safe use of portable drills, screwdrivers, and hammer drills.
27. Select from a list uses of a bench grinder.
28. State rules for safe use of bench grinders.
29. Select from a list uses of a portable power plane.
30. State rules for safe use of portable power planes.
31. Distinguish between uses of a rotary hammer and a chipping hammer.
32. State rules for safe use of rotary and chipping hammers.
33. Distinguish between uses of a portable angle grinder and a belt sander.
34. State rules for safe use of portable angle grinder and belt sander.
35. Distinguish between uses of pneumatic fasteners.
36. State rules for safe use of pneumatic fasteners.
37. Select from a list uses of a powder-actuated tool.
38. State rules for safe use of powder-actuated tools.
39. Select from a list uses of a power miter saw.
40. State rules for safe use of power miter saws.

CARPENTRY TOOLS
UNIT II

SUGGESTED ACTIVITIES

I. Unit contents

A. Objective sheet

B. Suggested activities

C. Supplement #1 — Hand Tools Crossword Puzzle

D. Information sheet

E. Assignment Sheet — Complete a Safety Test for Specific Power Tools

F. Test

G. Answers to test

II. Instructor's guide

A. Review unit and plan presentation.

B. Obtain materials to supplement unit.

1. Film — *Safety in the Shop: Hand Tools.* Black and white, 13.5 minutes, Coronet Films, 1970. Available from Coronet Films, 65 East Southwater Street, Chicago, Illinois 70701.

2. Slide set — *Tool Identification Slides.* Available from the Oklahoma State Department of Vocational and Technical Education/Curriculum and Instructional Materials Center, 1500 West Seventh Avenue, Stillwater, Oklahoma 74074.

3. Tool catalogs

(NOTE: Obtain several tool catalogs and display for students to review.)

4. Newspaper clippings or case studies that relate to safe hand tool use

5. Competency profiles

(NOTE: A master of the competency profile for this book is provided at the front of the instructor edition. You may duplicate the profile and distribute it to students as needed.)

SUGGESTED ACTIVITIES

C. Introduce unit to students.

- Show *Tool Identification Slides.*
- Ask students to review tool catalogs; discuss hand tools, pointing out the importance of buying good grades of tools. Tell students that quality, not price, should be their main concern when purchasing tools.

D. Provide students with objective sheet.

E. Discuss unit and specific objectives, emphasizing the care and safe use of hand tools.

F. Provide students with information and job sheets.

G. Discuss information and job sheets.

1. Use Information Sheet, Section I, to discuss terms and definitions.
   - Discuss or demonstrate terms that may be unfamiliar to students.
   - Have students review terms by completing Supplement #1, "Hand Tools Crossword Puzzle."
2. Use Information Sheet, Section II, to discuss guidelines for care and safe use of hand tools.
   - Show film *Safety in the Shop: Hand Tools.*
   - Have students explain details of accidents they know of when someone used hand tools improperly.
   - Discuss newspaper clippings or case studies that relate to safe hand tool use.
   - Demonstrate to students how to clean and store hand tools properly.
   - Demonstrate how the quantity and quality of work increases when using sharp tools as compared to using dull tools.
   - Explain your policy for replacement and repair of damaged tools.
   - Outline your tool-management policy for shop and job site.
3. Use Information Sheet, Section III, to discuss hand tools that a beginning carpenter needs.
   - Explain that although this is a complete list of the *hand* tools that a beginning carpenter needs, students will be expected to own other types of tools before starting to work.
   - Display each of the hand tools listed in this section of the information sheet.

SUGGESTED ACTIVITIES

4. Use Information Sheet, Section IV, to discuss types of hammers and their correct uses.

   - Display a sample of each type of hammer discussed in this section of the information sheet. Discuss the proper use of each hammer, and allow students to handle hammers.
   - Tell students to use the correct hammer for the job it was designed for. Caution students against hitting two hammer faces together.
   - Caution students against using a hammer for a nail bar and applying excess pressure on the handle. Demonstrate correct use by using a wood block for added leverage to lessen handle pressure.

5. Use Information Sheet, Section V, to discuss types of handsaws and their correct uses.

   - Display a sample of each type of handsaw discussed in this section of the information sheet. Discuss proper use of each handsaw, and allow students to handle saws.
   - Demonstrate cutting to a straight line.
   - Obtain damaged saws, and caution students against mishandling that causes dull or damaged saw teeth.
   - Demonstrate correct procedure for replacing the blade in a hacksaw frame so that the teeth point away from the handle.

6. Use Information Sheet, Section VI, to discuss types of squares and their correct uses.

   - Display a sample of each type of square discussed in this section of the information sheet. Discuss proper use of each square, and allow students to examine squares.
   - Caution students about careful handling of squares: Carefully handled squares are accurate instruments; damaged squares have no place in the skilled carpenter's tool box.

7. Use Information Sheet, Section VII, to discuss types of planes and their correct uses.

   - Display a sample of each type of plane discussed in this section of the information sheet. Discuss proper use of each plane, and allow students to examine planes.
   - Demonstrate the correct procedure for disassembling a plane, setting a plane iron and cap, and reassembling and adjusting a plane.

SUGGESTED ACTIVITIES

- Demonstrate how an improperly adjusted plane causes gouges and rough surfaces.

- Demonstrate the difference in a surface planed with a sharp plane iron and a surface planed with a dull plane iron; also point out the difference in chips.

8. Use Information Sheet, Section VIII, to discuss types of measuring instruments and their correct uses.

   - Display a sample of each measuring instrument discussed in this section of the information sheet. Discuss proper use of each instrument, and allow students to examine these instruments.

   - Stress the importance of proper care of measuring instruments—improper care causes inaccurate measurements.

   - Caution students against kinking steel tapes when measuring.

9. Use Information Sheet, Section IX, to discuss types of layout instruments.

   - Stress that leveling instruments are precision instruments that must be handled very carefully—an instrument that has been dropped or bumped may be inaccurate.

   - Demonstrate the procedure for checking level for accuracy and for leveling and plumbing.

10. Use Information Sheet, Section X, to discuss types of boring and drilling hand tools.

    - Display a sample of each type of boring and drilling tool discussed in this section of the information sheet. Discuss proper use of each boring and drilling tool, and allow students to examine these tools.

    - Demonstrate that a dull or incorrectly sharpened bit will not drill a round hole; point out that cutting edges must be protected.

11. Use Information Sheet, Section XI, to discuss types of screwdrivers.

    - Display a sample of each type of screwdriver discussed in this section of the information sheet; also have various types of screws available. Allow students to examine screwdrivers and screws.

    - Point out that screwdrivers must fit the screw slots properly. If the screwdriver is too large, it will damage the screw head; if the screwdriver is too small, it will be damaged.

    - Provide a few pieces of hardwood and some screws. Have students practice selecting the correct screwdriver to drive each screw, and have them practice driving screws into the wood.

SUGGESTED ACTIVITIES

- Demonstrate the technique of using pilot holes to aid in driving screws. Have students practice this technique.

12. Use Information Sheet, Section XII, to discuss types of pliers and their correct uses.

    - Display a sample of each type of plier discussed in this section of the information sheet. Discuss proper use of pliers, and allow students to examine pliers.

    - Remind students to use the correct tool for the job—pliers should not be used as wrenches to adjust nuts and bolts. Point out that nuts and bolts are frequently ruined when someone uses pliers instead of a wrench.

    - Have students list correct uses for pliers.

      EXAMPLES: Removing jammed staple in staple gun; removing cap on used glue bottle; fishing a wire out of a hole; tying reinforcing rods and wire mesh; loosening wing nuts on scaffolding; cutting reinforcing wire mesh; cutting head off finish nail; removing bent nails; removing damaged screws

13. Use Information Sheet, Section XIII, to discuss types of wrenches.

    - Display a sample of each type of wrench discussed in this section of the information sheet. Discuss proper use of wrenches, and allow students to examine wrenches.

14. Use Information Sheet, Section XIV, to discuss types of files.

    - Display a sample of each type of file discussed in this section of the information sheet. Discuss proper use of files, and allow students to examine files.

    - Caution students against using a file without a handle.

    - Point out to students that files have a series of cutters set at an angle so that they cut in one direction only and that trying to file in the wrong direction ruins the file.

    - Demonstrate the method of cleaning a file with a file card.

15. Use Information Sheet, Section XV, to discuss types of chisels.

    - Display a sample of each type of chisel discussed in this section of the information sheet. Discuss proper use of each chisel, and allow students to examine chisels.

    - Caution students to wear eye protection when working with chisels.

SUGGESTED ACTIVITIES

- Caution students against using chisels that have mushroomed heads.

- Caution students against using claw hammers for striking any chisel other than a wood chisel.

16. Use Information Sheet, Section XVI, to discuss types of clamps.

    - Display a sample of each type of clamp discussed in this section of the information sheet. Discuss proper use of each clamp, and allow students to examine clamps.

    - Demonstrate the use of each clamp.

17. Use Information Sheet, Section XVII, to discuss types of miscellaneous hand tools and their correct uses.

    - Display a sample of each type of tool discussed in this section of the information sheet. Discuss the correct use of each tool, and allow students to examine tools.

18. Use Information Sheet, Section XVIII, to discuss general safety precautions that must be followed when using power tools.

    - Show safety films.

    - Post at tool station safety rules for each stationary tool.

    - Make a display of accident report forms and safety posters.

    - Have carpenters who have been seriously injured by power tools talk to the class about their accidents.

19. Use Information Sheet, Section XIX, to discuss general guidelines for proper care of power tools.

    - Demonstrate the proper care of tools in general.

    - Display examples of tools that have been improperly cared for or abused.

20. Use the remaining sections of the information sheet to discuss the safety, care, and uses of each tool in accordance with your plan of presentation.

    (NOTE: We recommend that you present the material for a particular tool and require the student to correctly answer all the questions in Assignment Sheet #1 regarding that tool before allowing the student to use that particular tool.)

SUGGESTED ACTIVITIES

21. Have students complete training program offered by manufacturers of powder-actuated tools.

(NOTE: No one, student or teacher, should be allowed to operate a powder-actuated tool until he or she has been trained, certified, and issued a qualified operator's card. See example of operator's card below.)

EXAMPLE:

HILTI FASTENING SYSTEMS

H 888431

QUALIFIED OPERATOR
Powder Actuated Tools

DATE _____

_____ _____
SOCIAL SECURITY NO. DATE OF BIRTH

This certifies that _____
(NAME OF OPERATOR—PRINT)

has received the prescribed training in the operation of powder operated tools manufactured by HILTI FASTENING SYSTEMS

_____ _____
MAKE MODEL(S)

_____ _____
(SIGNATURE OF AUTHORIZED INSTRUCTOR) (INSTRUCTOR CARD NO.)

I have received the instruction in the safe operation and maintenance of powder actuated fastening tools of the makes and models specified and agree to conform to all rules and regulations governing their use.

_____
SIGNATURE

Revocation of card – Failure to comply with any of the rules and regulations for safe operation of powder actuated fastening tools shall be cause for the immediate revocation of this card, and it must be surrendered upon demand of the proper authority.

Used with permission of Hilti Fastening Systems, Tulsa, Oklahoma.

H. Review information sheet.

- Have each student demonstrate correct operation of power tools, using other students to critique the performances.
- Use Assignment Sheet #1 to review unit.

I. Give test.

J. Critique test and discuss in class.

K. Reteach and retest as necessary.

L. Complete appropriate section of competency profiles.

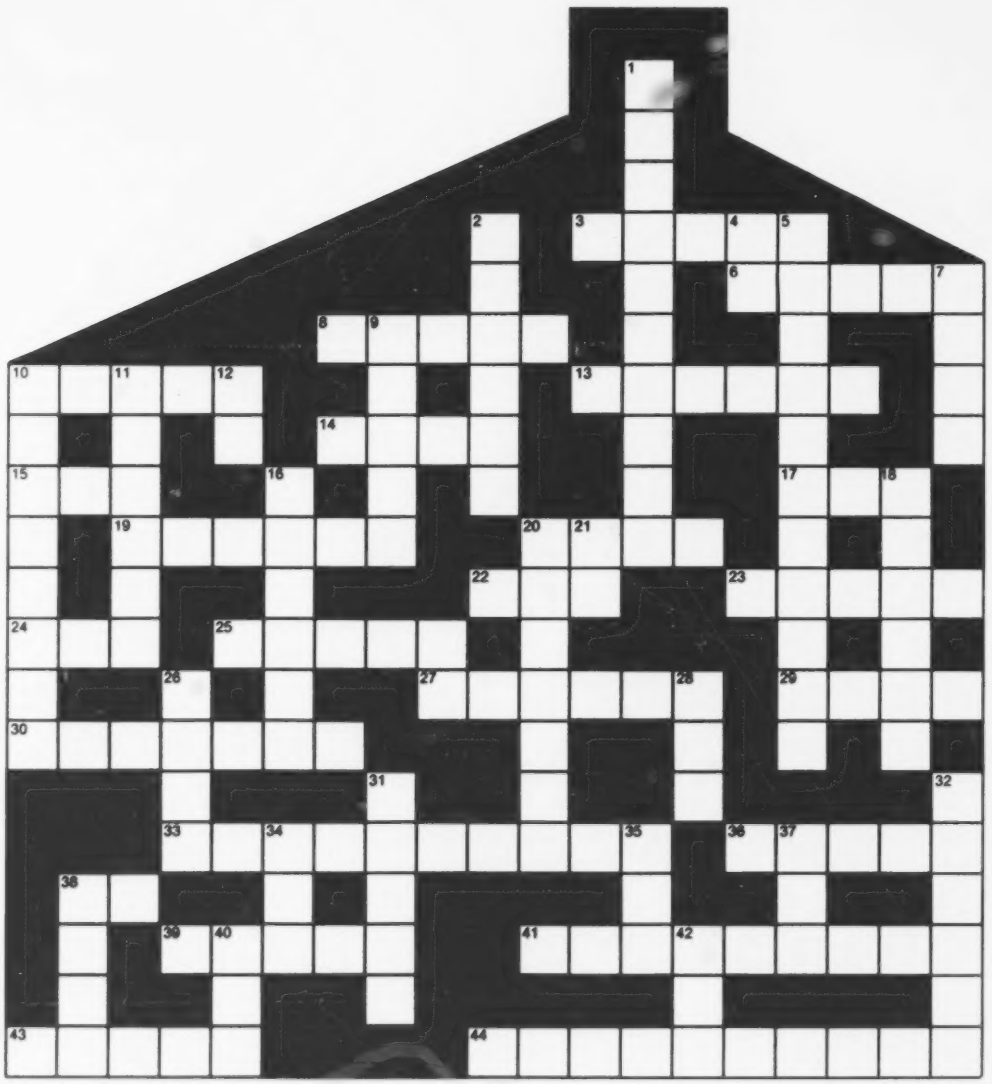
III. Unit reference

Hendrix, Laborn J. "Bud." *Fundamentals of Carpentry*. Stillwater, Oklahoma: Oklahoma State Department of Vocational and Technical Education/Curriculum and Instructional Materials Center, and The Associated General Contractors of America, 1985.

CARPENTRY TOOLS
UNIT II

SUPPLEMENT #1 — HAND TOOLS CROSSWORD PUZZLE

Use Information Sheet and the clues on the following page to complete the hand tools crossword puzzle below.



SUPPLEMENT #1

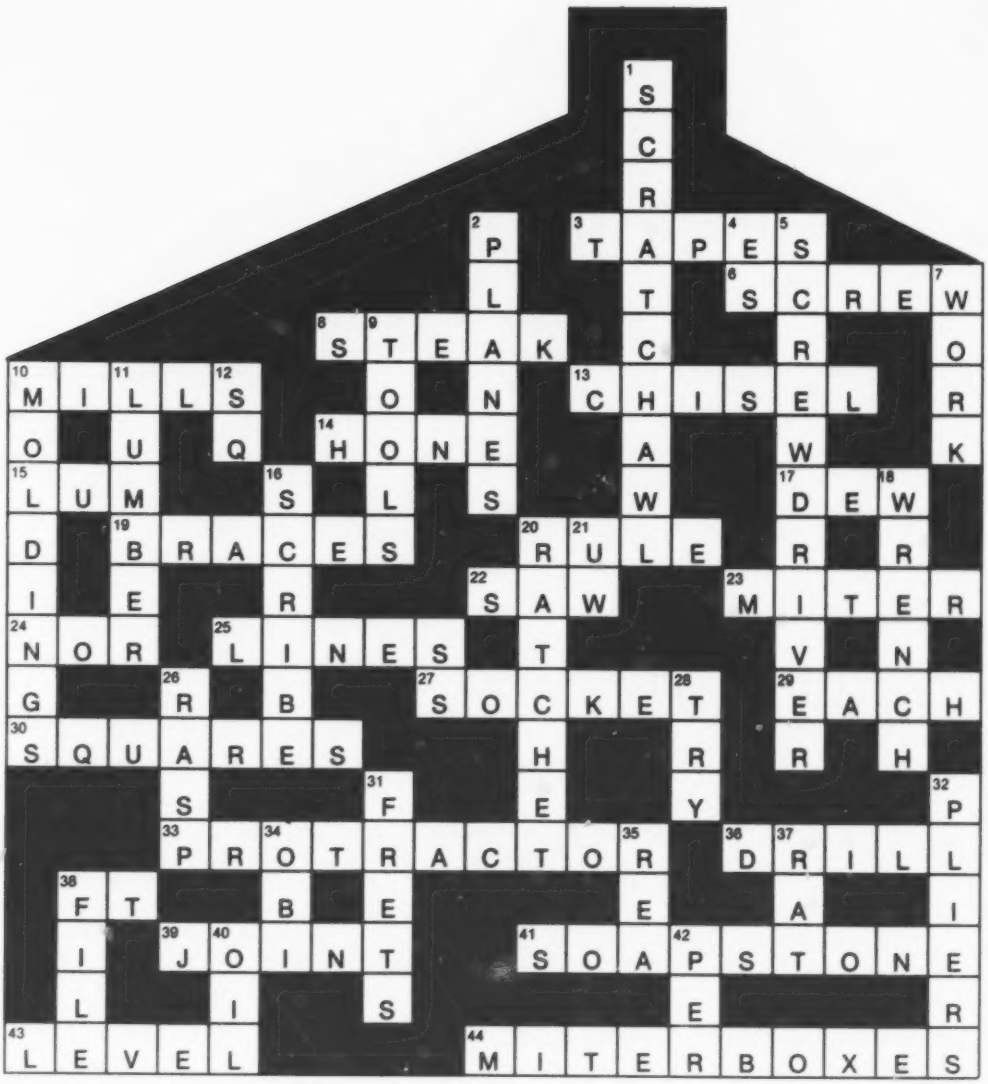
ACROSS

3. Flexible measuring tools
6. Metal rod with head and threaded shank
8. Red meat
10. Places that surface lumber
13. For example, wood, cold, brick, or stripping
14. To sharpen with a whetstone or oilstone
15. Lumber (abbr)
17. Moisture that condenses after a warm day
19. Tools used to hold and operate bits
20. Folding measuring instrument
22. For example, crosscut, dovetail, or coping
23. Cut made at an angle for joining two pieces of wood
24. Neither, - - -
25. Cords used for laying out building work
27. Accessory for ratchet wrench
29. Both of two
30. See 28 Down
33. Instrument for laying out angles
36. Tool used to make holes in wood or metal
38. Foot (abbr)
39. Place where two or more surfaces meet
41. Soft stone used for marking metal
43. Tool used to check level or plumb
44. Devices for guiding a backsaw at proper angle for cutting a miter joint in wood

DOWN

1. Sharp, pointed piece of steel used for marking wood or steel
2. Tools used to remove excess wood from surfaces
4. Plural ending for *box*
5. Tool used to drive screws
7. Entire scope of activity performed at construction site
9. Saws, hammers, chisels, drills, etc.
10. Strips of wood or plastic used for decorative purposes
11. Any material cut from timber
12. Square (abbr)
16. Type of divider
18. Tool used to set up and adjust machinery and to work with metal and hardware fasteners
20. Type of wrench that allows torque to be applied
21. Underwriters (abbr)
26. Coarse, file-like tool used to shape and finish wood
28. With 30 Across, tools used to measure and check 45-degree and 90-degree angles
31. Ornamental patterns
32. Tools used to hold, bend, shape, and cut wire
34. Japanese sash
35. Rural Electric Association (abbr)
37. Rodent
38. Tool with single-cut or double-cut teeth used for finishing wood or metal surfaces
40. Lubricant
42. $1.00 - - - dozen

SUPPLEMENT #1


1 S C R
2 P L
3 T A P E 4 E 5 S
T 6 S C R E 7 W
8 S 9 T E A K C R O
10 M I 11 L L 12 S O N 13 C H I S E L R
O U Q 14 H O N E A W K
15 L U M 16 S L S W 17 D E 18 W
D 19 B R A C E S 20 R 21 U L E R R
I E R 22 S A W 23 M I T E R
24 N O R 25 L I N E S T V N
G 26 R B 27 S O C K E T 28 29 E A C H
30 S Q U A R E S H R R H
S 31 F E Y 32 P
33 P R 34 O T R A C T O 35 R 36 D 37 R I L L
38 F T B E E A I
I 39 J 40 O I N T 41 S O A 42 P S T O N E
L I S E R
43 L E V E L 44 M I T E R B O X E S

CARPENTRY TOOLS
UNIT II

INFORMATION SHEET

I. Terms and definitions

A. **Joint** — Place where two or more surfaces meet

B. **Miter** — Cut made at an angle for joining two pieces of wood so that they will form an angle

C. **Miter box** — Device for guiding a backsaw at the proper angle for cutting a miter joint in wood

D. **Fret** — Ornamental pattern

E. **Molding** — Strip of wood, plastic, or metal used for decorative purposes

F. **Protractor** — Instrument for laying out angles

G. **Chamfer** — Edge of board beveled at 45-degree angle; may be angular or curved

H. **Soapstone** — Soft stone having a soapy feel; used for marking metal

I. **Dado** — Rabbet or groove cut in wood

J. **Mortise** — Cut-out area or depression made to receive something such as hinges on doors

II. Guidelines for care and safe use of hand tools

A. Use the correct tool for the job

B. Keep tools sharp

C. Keep tools clean

D. Inspect tools frequently to make sure they are in good condition

E. Repair broken or damaged tools promptly

F. Dispose of broken or damaged tools that cannot be repaired

G. Store tools properly when not in use

EXAMPLES: Do not carry tools in your pockets; do not place tools on workbench where they can roll off; protect cutting edges; lightly oil tools before storing; store tools in dry place.

H. Stay alert when using tools

EXAMPLES: Keep fingers away from cutting edges; work away from your body when using cutting tools.

I. Wear eye protection when necessary

INFORMATION SHEET

III. Hand tools a beginning carpenter needs

(NOTE: Carpenters are expected to own this set of hand tools before starting to work.)

A. Hammer
B. Handsaw
C. Hacksaw
D. Chalk line
E. One-hundred-foot tape
F. Rule or tape
G. Square
H. Level
I. Utility knife
J. Hand brace and bit
K. Plane
L. Standard screwdrivers
M. Phillips screwdrivers
N. Pliers
O. Adjustable wrench
P. File
Q. Chisel
R. Ripping or pry bar
S. Scratch awl

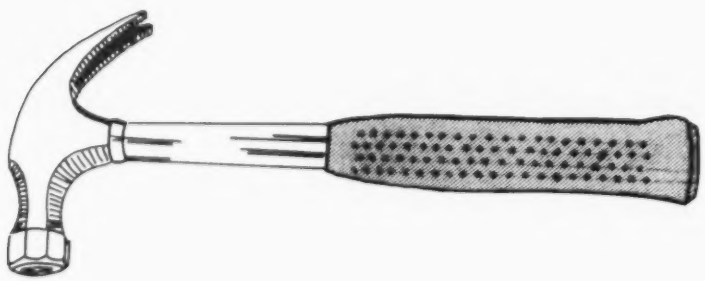
IV. Uses of types of hammers (Figures 1 and 2)

(NOTE: The following tools are tools that would be furnished by the carpenter and not by the contractor.)

A. Curved-claw hammer — Used to drive and pull nails

EXAMPLE:

FIGURE 1



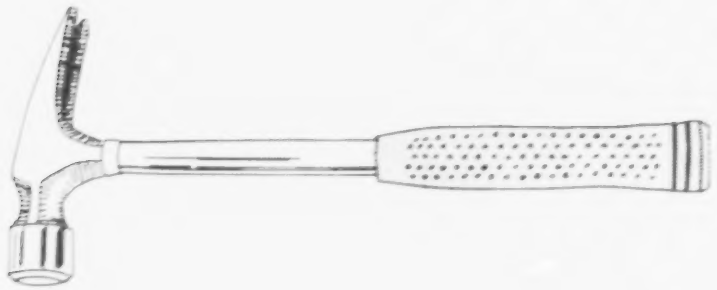
Curved-claw hammers weigh from 13 ounces to 20 ounces; handles are made of wood, fiberglass, or steel.

INFORMATION SHEET

B. Straight-claw hammer — Used to drive nails, pull nails, dismantle, and wreck

EXAMPLE:

FIGURE 2



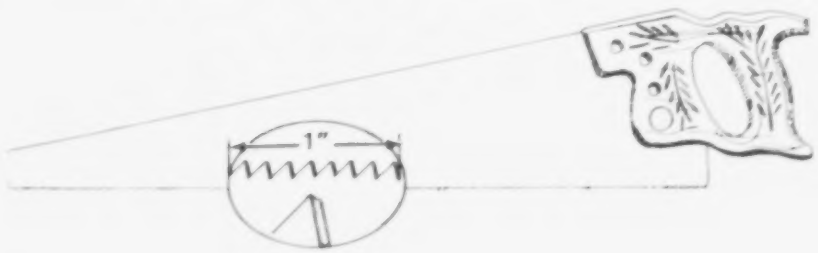
Standard straight-claw hammers weigh from 16 ounces to 21 ounces; straight-claw hammers weighing from 22 ounces to 28 ounces are called *framing hammers*.

V. Uses of types of handsaws (Figures 3-9)

A. Crosscut saw — Used to cut across the grain of wood

EXAMPLE:

FIGURE 3



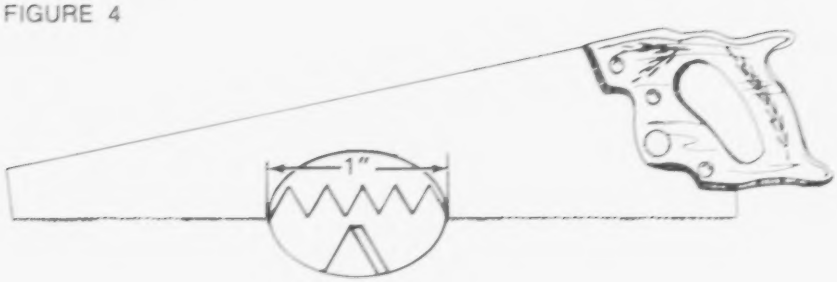
Crosscut saws come in lengths of 20 inches to 26 inches with four to twelve points per inch; teeth are filed at an angle across the face.

INFORMATION SHEET

B. Ripsaw — Used to cut with the grain of wood

EXAMPLE:

FIGURE 4



Ripsaws come in lengths of 20 inches to 28 inches with five to seven points per inch; teeth are filed square across the face.

C. Dovetail saw — Used to cut smoothest possible joints (tenons, mortises, etc.)

EXAMPLE:

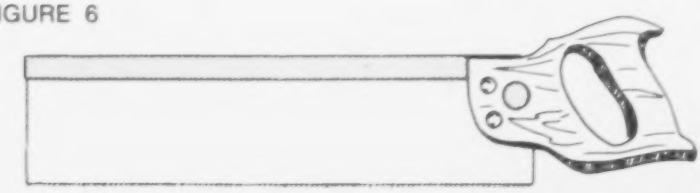
FIGURE 5

Dovetail saws are 10 inches long with seventeen points per inch; they have very fine teeth and an extremely thin steel blade with a rigid steel back to strengthen the blade.

D. Backsaw (miter-box saw) — Used to cut fine joints; also used in a miter box to cut miters or square ends

EXAMPLE:

FIGURE 6



Backsaws come in lengths of 12 inches to 28 inches with eleven to thirteen points per inch; they have fine teeth, a thin blade, and a heavy steel band across the back to strengthen the blade.

INFORMATION SHEET

E. Compass saw (keyhole saw) — Used to cut inside corners, curves, circles, and frets

EXAMPLE:

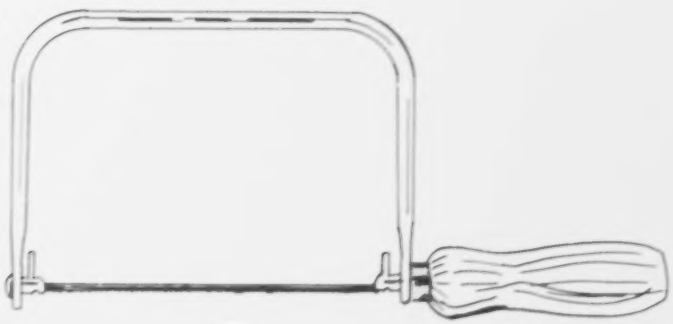
FIGURE 7

Compass saws come in lengths of 10 inches to 14 inches; their tapered blade can be reversed or set in various positions; some have a replaceable blade.

F. Coping saw — Used to cut curves and to shape ends of molding and trim for joints

EXAMPLE:

FIGURE 8

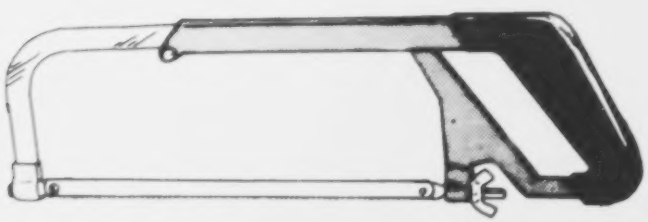


The coping saw's U-shaped frame permits cuts as deep as 6¼ inches; blade is replaceable.

G. Hacksaw — Used to cut metal

EXAMPLE:

FIGURE 9



Hacksaws have U-shaped frames and replaceable blades that come in lengths of 8 inches to 12 inches.

INFORMATION SHEET

VI. Uses of types of squares (Figures 10-14)

A. Framing square (rafter square) — Used in general framing to lay out walls, partitions, rafters, braces, and stairs

EXAMPLE:

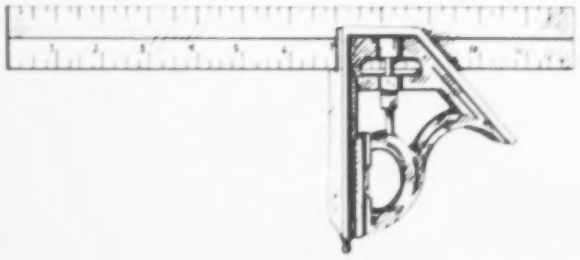
FIGURE 10

Framing squares have a 24-inch-by-2-inch calibrated blade and a 16-inch-by-1½-inch calibrated tongue. Rafter and brace tables are stamped on the blade.

B. Combination square — Used to check squareness and to mark 45-degree miters

EXAMPLE:

FIGURE 11



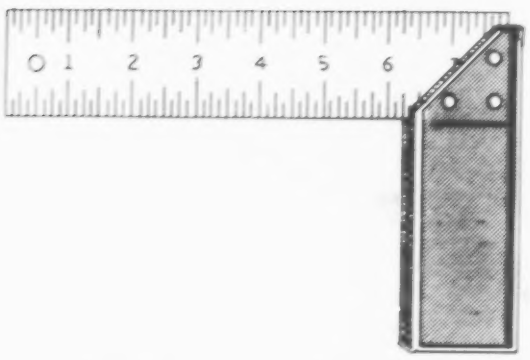
Combination squares have a 12-inch blade and an adjustable handle that contains a level vial and a scribe (scratch awl). Handles are made with a 45-degree and a 90-degree side.

INFORMATION SHEET

C. Try square — Used to measure and check 45-degree and 90-degree angles

EXAMPLE:

FIGURE 12

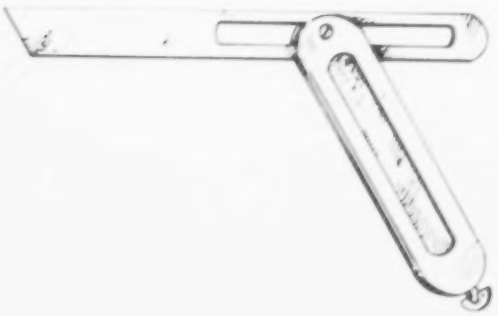


Try squares have a 6-inch to 12-inch blade that is graduated every ⅛ inch; their stationary handle comes in lengths of 4⅜ inches to 8 inches.

D. Sliding T-bevel — Used to measure or transfer angles from 0 degree to 180 degrees and to check miter cuts

EXAMPLE:

FIGURE 13



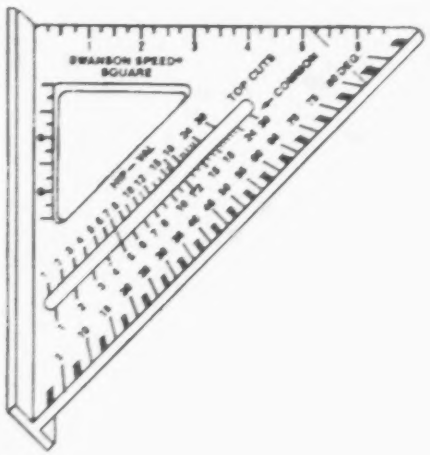
Sliding T-bevels have a solid wood or metal handle, an adjustable metal blade that comes in lengths of 4 inches to 8 inches, and a locking device.

INFORMATION SHEET

E. Triangular rafter square — Used to mark and check angles

EXAMPLE:

FIGURE 14



Speed™ square used with permission of the Swanson Tool Company, Frankfort, Illinois.

Speed™ squares are combination tools with features of a protractor, try, miter, and framing square. Speed™ squares are 7-inch triangular tools with a 6-inch scale on one edge, a full 90-degree scale on one edge, and a T-bar on the third edge. The inner scales include a 2 ½-inch scale on one side for laying out corners and a Common and Hip-Valley rafter scale for laying out rafters using the Swanson "one-number" method. A similar 12-inch square (The Big-12®) is used for stair layout, "crooked corner" adjustments, and wider materials.

VII. Uses of types of planes (Figures 15-18)

(NOTE: Planes are used to remove excess wood from surfaces and leave them smooth and straight. Planes come in a variety of sizes. Plane frames are made of wood or metal; their blades are made of steel called *plane iron*. The two general types of planes are the hand-operated block planes and the bench planes.)

A. Block plane — Used to plane small pieces, edges, joint surfaces, and grain or cross grain when a small amount of change is required

EXAMPLE:

FIGURE 15

Block planes come in 4-inch to 7-inch lengths and 1⅜-inch to 1⅝-inch widths. Some block planes are fully adjustable, including the mouth; blades may be set from 12 degrees to 21 degrees.

INFORMATION SHEET

B. Bench planes

1. Jack plane — Used to plane rough work to produce a fairly smooth surface

   EXAMPLE:

FIGURE 16

Jack planes are 14 inches long and 2 inches wide; they have a fully adjustable blade and a hardwood handle and knob.

2. Smoothing plane — Used to plane small work to a smooth and even surface without taking off too much material

   EXAMPLE:

FIGURE 17

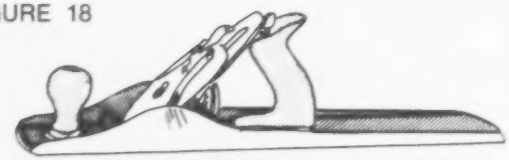
Smoothing planes come in lengths of 7 inches to 10 inches and widths of 1⅝ inches to 2 inches. They have a hardwood handle and knob and a fully adjustable blade. Some smoothing planes have an adjustable mouth opening.

INFORMATION SHEET

3. Jointer plane — Used to plane and true long boards such as edges for wood doors

EXAMPLE:

FIGURE 18



Jointer planes come in 18-inch to 30-inch lengths; their cutting edge is ground straight and is set for a fine cut.

VIII. Uses of types of measuring instruments (Figures 19-21)

A. Folding rule (zigzag rule) — Used to make accurate inside measurements

EXAMPLE:

FIGURE 19

Folding rules come in 6-foot or 8-foot lengths.

B. Flexible steel tape — Used to measure irregular as well as regular shapes and to make accurate inside measurements

EXAMPLES:

FIGURE 20

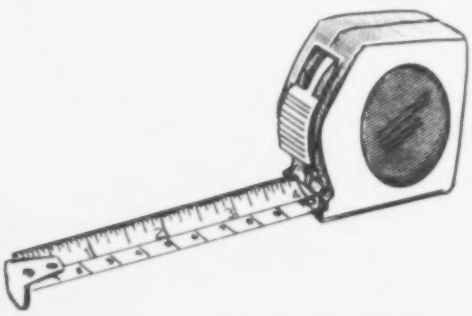
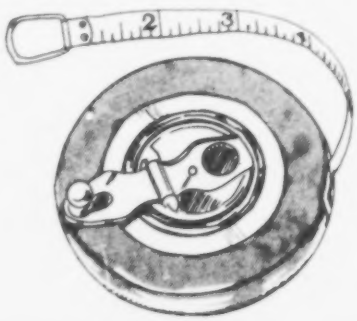


FIGURE 21



Flexible steel tapes slide into a metal case. Most short tapes come in 6-foot to 25-foot lengths; long tapes come in 50-foot to 100-foot lengths. Both types of flexible steel tapes have a hook or loop on the end adjusted to true zero.

INFORMATION SHEET

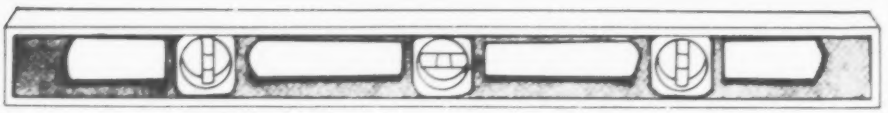
IX. Types of layout instruments

A. Levels (Figures 22-24)

(NOTE: Levels are used to check if a surface is level or plumb.)

1. Spirit level

FIGURE 22



2. Torpedo level

FIGURE 23

3. Line level

FIGURE 24

B. Plumb bob (Figure 25)

(NOTE: Plumb bobs are used to establish building lines and corners and to check vertical lines.)

FIGURE 25

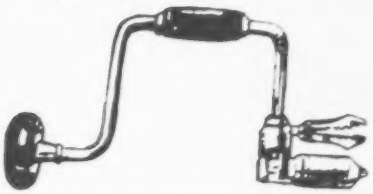
INFORMATION SHEET

X. Types of boring and drilling hand tools

A. Boring tools (Figures 26-29)

1. Hand brace

FIGURE 26



Hand braces are used to hold and operate bits.

2. Auger bit

FIGURE 27

Auger bits come with a single-twist or a double-twist; sizes range from 1/4 inch (No. 4) to 1 inch (No. 16).

3. Expansive bit (expansion bit)

FIGURE 28

Expansive bits hold cutters of different sizes. One cutter will bore holes in the 1-inch to 2-inch range; a second cutter will bore holes in the 2-inch to 3-inch range.

4. Power bit (flat bit, speed bit)

FIGURE 29

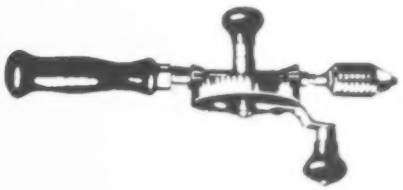
Power bits are available in sizes ranging from 1/4 inch to 1 1/2 inches by 1/16-inch increments. They have become increasingly popular because the shank is 1/4 inch on all sizes.

INFORMATION SHEET

B. Drilling tools (Figures 30-34)

1. Hand drill (eggbeater)

FIGURE 30



Hand drills are used to hold twist drills for drilling small holes.

2. Push drill (automatic drill)

FIGURE 31

Push drills are tools with a drill point and a handle; they are used to drill many small holes.

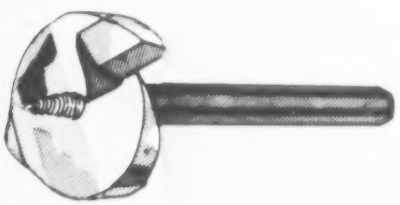
3. Twist drill (spiral drill)

FIGURE 32

Twist drills are used to drill small holes for nails, screws, etc. Most twist-drill sets range from 1/64 inch to 1/2 inch.

4. Lockset bit

FIGURE 33



Lockset bits are used to make cuts for holding a lock in a door.

INFORMATION SHEET

5. Hole saw

FIGURE 34

Hole saws consist of a hollow cylinder with teeth around its edge; they are used for cutting round holes.

XI. Types of screwdrivers (Figures 35-44)

(NOTE: Select a screwdriver that is shaped to fit the screw slot properly and is ground to the correct size. If the screwdriver is too large, it will damage the screw head. If the screwdriver is too small, it will be damaged.)

A. Standard screwdriver (flat-blade screwdriver)

FIGURE 35

B. Phillips screwdriver

FIGURE 36

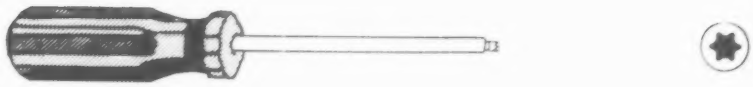
INFORMATION SHEET

C. Clutch-head screwdriver

FIGURE 37

D. Torx-head screwdriver

FIGURE 38

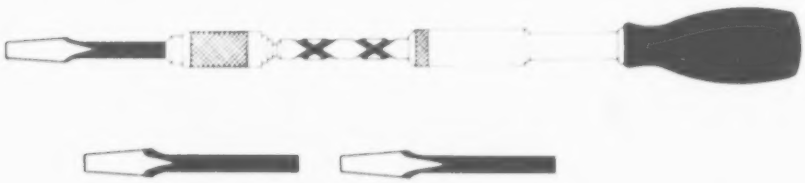


E. Square-head screwdriver (Robertson screwdriver)

FIGURE 39

F. Spiral ratchet screwdriver (automatic screwdriver)

FIGURE 40

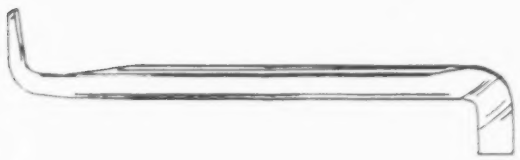


Spiral ratchet screwdrivers operate with a pushing-up-and-down action rather than with a turning action.

INFORMATION SHEET

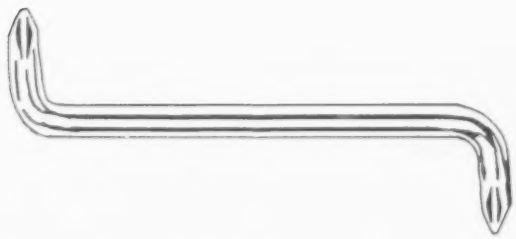
G. Standard offset screwdriver

FIGURE 41



H. Phillips offset screwdriver

FIGURE 42



I. Standard screwdriver bit

(NOTE: Standard screwdriver bits must be used with a hand brace.)

FIGURE 43

J. Phillips screwdriver bit

(NOTE: Phillips screwdriver bits must be used with a hand brace.)

FIGURE 44

INFORMATION SHEET

XII. Uses of types of pliers (Figures 45-48)

A. Side-cutting pliers — Used to hold, bend, shape, and cut wire

EXAMPLE:

FIGURE 45

B. Needle-nose pliers — Used to hold and bend thin wire and metal fittings and to hold small objects in tight places

EXAMPLE:

FIGURE 46

C. Combination slip-joint pliers — Used to hold and turn small round parts

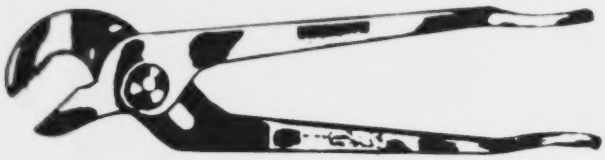
EXAMPLE:

FIGURE 47

D. Channel-lock pliers — Used to hold and turn large round parts

EXAMPLE:

FIGURE 48



XIII. Types of wrenches (Figures 49-56)

(NOTE: In building construction, wrenches are used to set up and adjust machinery and to work with metal hardware and fasteners.)

A. Open-end wrench

FIGURE 49

Open-end wrenches have an accurately machined, nonadjustable opening in each end; sizes of these openings are stamped on the tool. Open-end wrenches are used where there is plenty of clearance for movement.

B. Box-end wrench

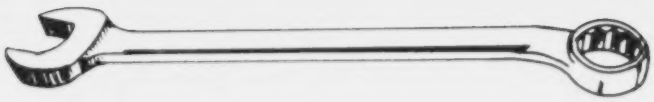
FIGURE 50

Box-end wrenches have two enclosed, nonadjustable heads that may be offset from 15 degrees to 45 degrees; they are used where there is limited space for movement.

INFORMATION SHEET

C. Combination wrench

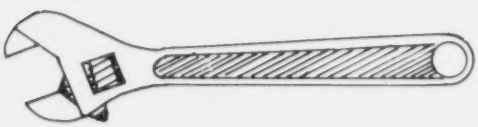
FIGURE 51



Combination wrenches have an open-end wrench at one end and a box-end wrench at the other end.

D. Adjustable wrench

FIGURE 52



Adjustable wrenches have one adjustable jaw and one fixed jaw; they are used where there is plenty of clearance for movement.

E. Pipe wrench

FIGURE 53

Pipe wrenches have one fixed jaw and one adjustable jaw; they are used to work on pipes and rods.

F. Allen wrench (hex-key wrench)

FIGURE 54

Allen wrenches are hexagonal steel bars with bent ends; they are used to tighten and loosen set-screws.

INFORMATION SHEET

G. Ratchet wrench and socket

FIGURE 55: Ratchet wrench

FIGURE 56: Socket

Ratchet wrenches contain a ratchet that allows torque to be applied in one direction only; sockets of various sizes may be attached to the wrench.

XIV. Types of files (Figures 57-64)

(NOTE: Files are used to smooth and shape surfaces on which edge-cutting tools cannot be used. Files come in various shapes, sizes, and types of cuts.)

A. Flat

FIGURE 57

B. Round

FIGURE 58

C. Half-round

FIGURE 59

D. Square

FIGURE 60

INFORMATION SHEET

E. Triangular (three-square)

FIGURE 61

F. Slitting

FIGURE 62

G. Cant saw

FIGURE 63

H. Knife

FIGURE 64

XV. Types of chisels (Figures 65-70)

(NOTE: Chisels are used for joint construction, for removal or stripping of excess material, and for cutting masonry and steel.)

A. Wood chisel

FIGURE 65

Wood chisels come in blade sizes of ¼-inch to 2 inches in ¼-inch increments.

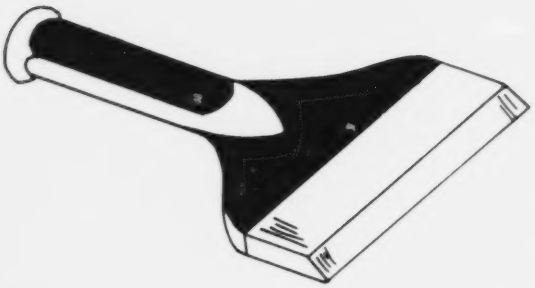
INFORMATION SHEET

B. Cold chisel

FIGURE 66

C. Brick chisel

FIGURE 67



D. Stripping chisel

FIGURE 68

E. Floor chisel (straight-blade chisel)

FIGURE 69

INFORMATION SHEET

F. Ripping chisel

FIGURE 70

XVI. Types of clamps (Figures 71-76)

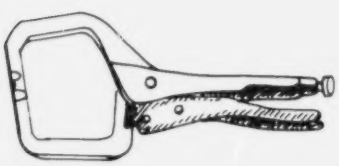
(NOTE: Clamps are tools for binding or pressing two or more parts together and holding them firmly in their relative positions; they are often used to hold pieces of wood together while the glue dries.)

A. C-clamp

FIGURE 71

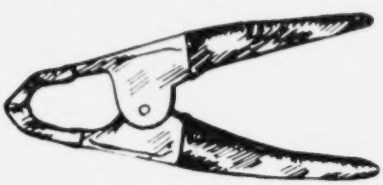
B. Locking C-clamp

FIGURE 72



C. Spring clamp

FIGURE 73

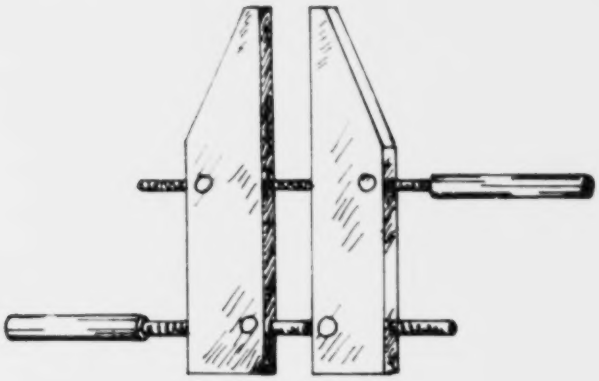


D. Bar clamp

FIGURE 74

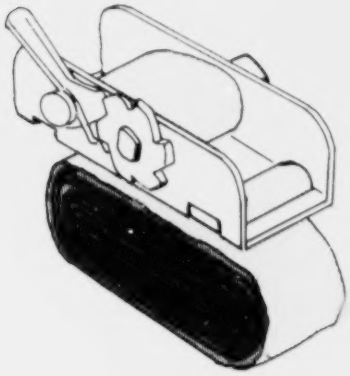
E. Hand-screw clamp

FIGURE 75



F. Web clamp (strap clamp)

FIGURE 76



INFORMATION SHEET

XVII. Uses of miscellaneous hand tools (Figures 77-90)

A. Divider and scribe — Used lay out an arc or circle, to step off measurements, and to divide distances along a straight line

EXAMPLES:

FIGURE 77: Divider

FIGURE 78: Pencil divider

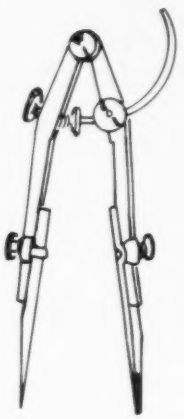
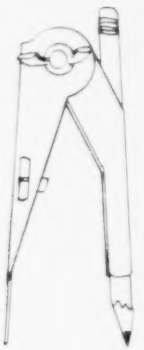


FIGURE 79: Scribe



B. Nail set — Used to sink a nail below the surface

EXAMPLE:

FIGURE 80

C. Tin snips — Used to cut lightweight metal

EXAMPLE:

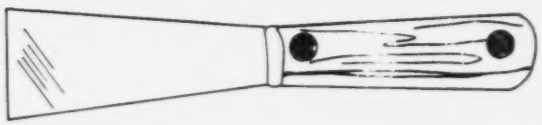
FIGURE 81: Aviation-type tin snips

INFORMATION SHEET

D. Putty knife — Used to scrape and apply putty and wood fillers

EXAMPLE:

FIGURE 82



E. Nail claw — Used to pull nails

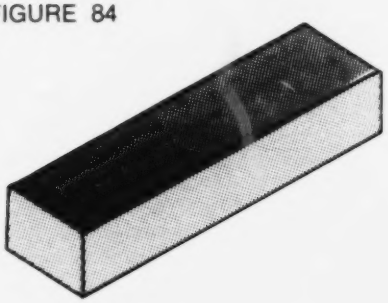
EXAMPLE:

FIGURE 83

F. Oilstone — Used to hone the final keen edge on tools with cutting edges

EXAMPLE:

FIGURE 84



INFORMATION SHEET

G. Wood rasp — Used to shape and finish wood

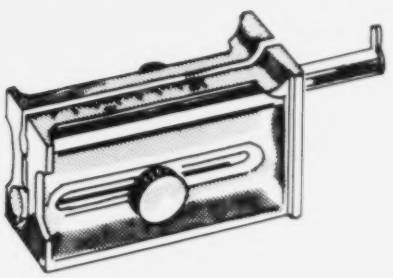
EXAMPLE:

FIGURE 85

H. Butt gauge — Used to mark for position and thickness of the butt hinges on doors and door casings, and to mark location of lock plates and strike plates

EXAMPLE:

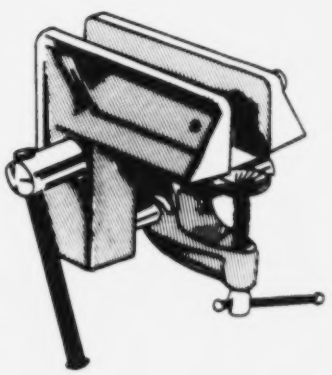
FIGURE 86



I. Woodworker's vise — Used to hold a workpiece while planing or trimming

EXAMPLE:

FIGURE 87



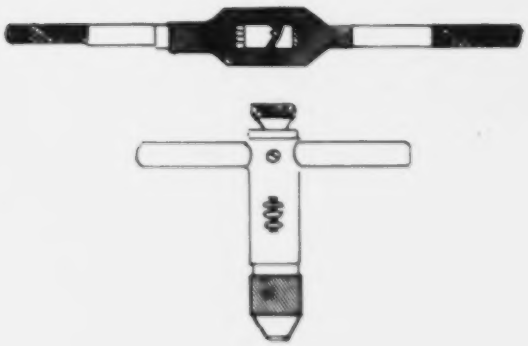
INFORMATION SHEET

J. Tap and tap wrench — Used to form an internal screw thread

EXAMPLES:

FIGURE 88: Tap

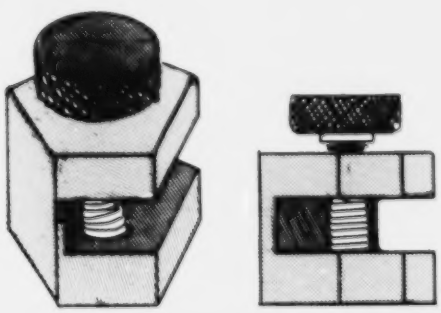
FIGURE 89: Tap wrench



K. Stair gauge — Used with a framing square to lay out correct angle of riser height and tread run for each step on stair carriage

EXAMPLE:

FIGURE 90



INFORMATION SHEET

XVIII. General safety rules pertaining to portable power tools

(NOTE: Power tools may be powered by electricity [AC or DC current], air, combustion engines, or explosive powder.)

A. Do not attempt to operate any power tool before being checked out by instructor on that particular tool

B. Always wear eye protection and hard hat when operating a power tool

C. Wear appropriate clothing for job being done

(NOTE: Always wear tight-fitting clothing that cannot become caught in the moving tool. Roll up long sleeves, tuck in shirttails, and tie back long hair.)

D. Do not distract others or let anyone distract you while operating a power tool

E. Do not leave power tool running unattended

F. Assume a safe and comfortable position before using a power tool

G. Be sure that power tool is properly grounded before using

H. Be sure that power tool is disconnected before performing maintenance or changing accessories

I. Do not use dull or broken tool or accessories

J. Use a power tool only for its intended use

K. Keep feet, fingers, and hair away from the blade and other moving parts of a power tool

L. Do not use a power tool with guards or safety devices removed

M. Do not operate a power tool if hands or feet are wet

N. Keep work area clean at all times

O. Before attempting to use it, be familiar with the correct operation and adjustments of power tool

P. Keep a firm grip on the power tool at all times

Q. Use grounded electric extension cords of sufficient size to service particular power tool you are using

INFORMATION SHEET

XIX. General guidelines for proper care of power tools

A. Keep tools clean and in good working order

B. Keep machine surfaces clean and waxed

C. Follow manufacturer's maintenance procedures

D. Protect cutting edges

E. Keep all tool accessories, such as blades and bits, sharp

F. Always use appropriate blade for the arbor size

G. Report any unusual noises, sound, or vibrations to the instructor or supervisor

H. Inspect tools and accessories regularly

I. Keep tools in their proper place when not in use

XX. Portable power tools used by carpenters

(NOTE: The following tools are usually furnished by the contractors, not by the carpenters.)

A. Circular saw

B. Jigsaw

C. Band saw

D. Router

E. Trimmer

F. 1/4-inch drill

G. 3/8-inch drill

H. 1/2-inch drill

I. Screwdriver

J. Hammer drill

K. Bench grinder

L. Power plane

M. Rotary hammer

N. Chipping hammer

O. Angle grinder

P. Belt sander

Q. Pneumatic nailer

R. Pneumatic stapler

S. Powder-actuated tool

T. Miter saw

INFORMATION SHEET

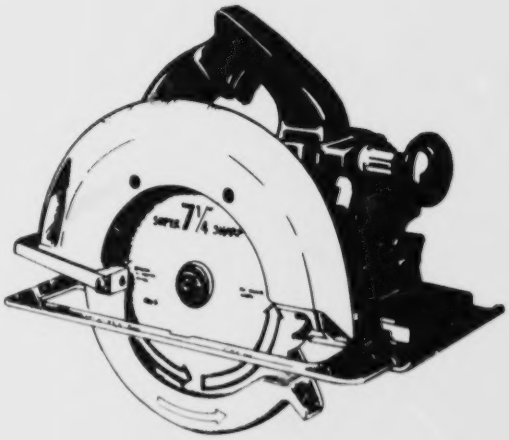
XXI. Uses of portable power saws

A. Circular saw (Figure 91)

1. Ripping
2. Crosscutting
3. Making miter cuts
4. Making pocket cuts
5. Making bevel cuts

EXAMPLE:

FIGURE 91

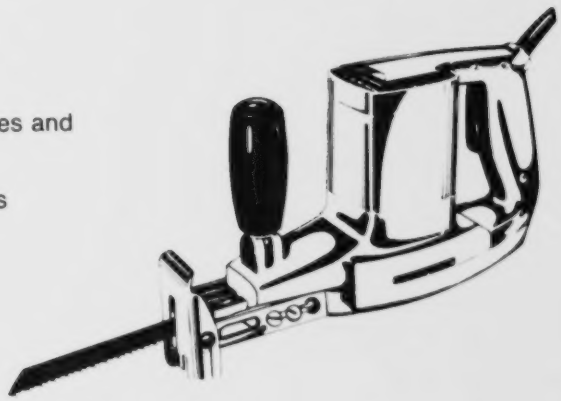


B. Reciprocating saw (Figure 92)

1. Making irregular cuts
2. Crosscutting
3. Making relief cuts
4. Making inside curves and corner cuts
5. Making pocket cuts

EXAMPLE:

FIGURE 92



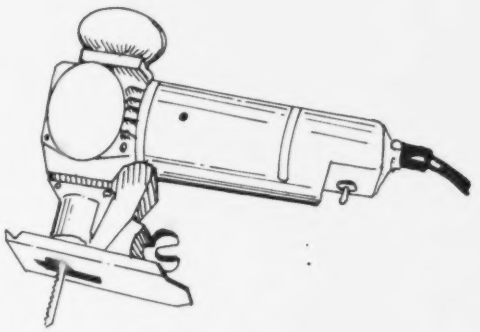
INFORMATION SHEET

C. Jigsaw (saber saw) (Figure 93)

1. Making curves and scroll cuts
2. Making inside curves and corner cuts
3. Making pocket cuts
4. Ripping
5. Crosscutting
6. Making relief cuts

EXAMPLE:

FIGURE 93

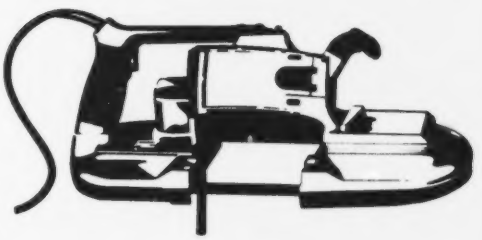


D. Band saw (Figure 94)

1. Cutting metal studs
2. Cutting angle iron and steel rods
3. Cutting pipe

EXAMPLE:

FIGURE 94



INFORMATION SHEET

XXII. Rules for safe use of portable power saws

A. Circular saw

1. Keep electric cord clear of blade to avoid cutting cord
2. Be sure that automatic guard is free and retractable

> **CAUTION**
> *Never* lock automatic guard in the retracted position.

3. Check stock for nails and any other metal before cutting
4. Use a good, solid support for stock while cutting
5. Allow saw to gain maximum speed before starting cut
6. Set blade only deep enough to cut through stock
7. Lay saw on its side after finishing the cut

B. Reciprocating saw and jigsaw

1. Keep electric cord clear of blade to avoid cutting cord
2. Use the correct blade for the job being done
3. Do not force blade into stock
4. Turn off motor immediately after finishing the cut

C. Band saw

1. Use proper blade size to avoid breakage
2. Use correct blade for job being done
3. Do not force blade into stock

INFORMATION SHEET

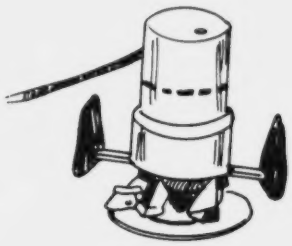
XXIII. Uses of a router and a trimmer

A. Router (Figure 95)

1. Shaping edges
2. Rabbeting
3. Beveling
4. Dovetailing
5. Dadoing, fluting, and reeding
6. Mortising

EXAMPLE:

FIGURE 95

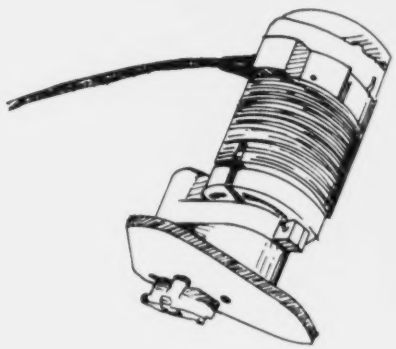


B. Trimmer (Figure 96)

1. Cutting laminate
2. Bevel trimming
3. Flush trimming
4. Cutting obtuse and acute angles

EXAMPLE:

FIGURE 96



XXIV. Rules for safe use of routers and trimmers

A. Avoid making cuts too deep for tool being used

(NOTE: Too deep a cut can cause kickbacks.)

B. Be sure that stock is secured properly before routing

C. Always use a door jack when routing for door hinges

D. Always use jigs and guides with router; never rout or plow freehand

E. When using a router or trimmer, approach workpiece gently; never gouge bit into stock

INFORMATION SHEET

XXV. Uses of a portable drill, screwdriver, and hammer drill

A. Drill (See Figures 97 and 98)

1. Boring and drilling
2. Cutting holes with hole saw
3. Mixing materials
4. Driving screws

EXAMPLES:

FIGURE 97: 1/4-inch drill

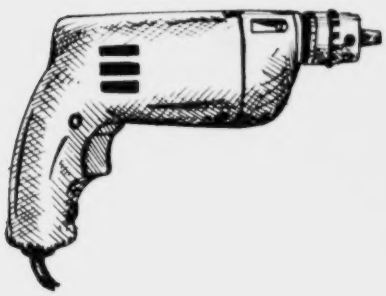
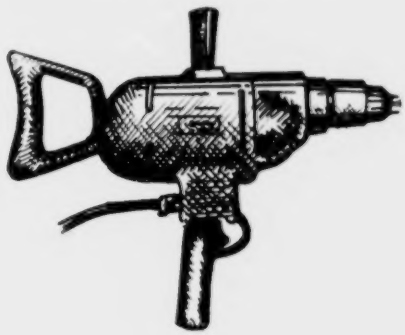


FIGURE 98: 1/2-inch drill

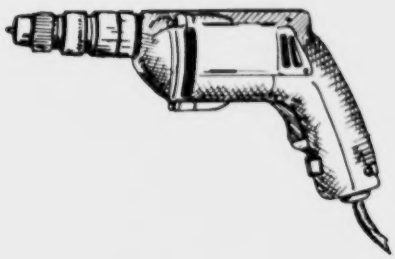


B. Screwdriver (Figure 99)

1. Driving and removing wood screws
2. Driving and removing machine screws
3. Driving and removing thread-cutting screws
4. Driving and removing lag bolts

EXAMPLE:

FIGURE 99



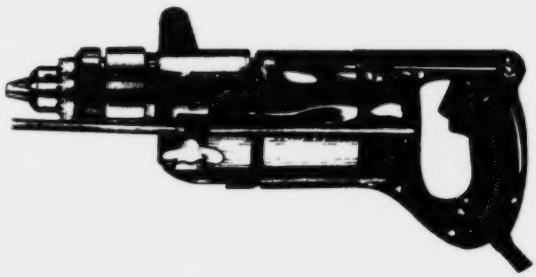
INFORMATION SHEET

C. Hammer drill (Figure 100)

1. Drilling holes in masonry and concrete
2. Drilling holes in wood and other materials
3. Setting anchors
4. Performing light chipping work
5. Mixing materials

EXAMPLE:

FIGURE 100



XXVI. Rules for safe use of portable drills, screwdrivers, and hammer drills

A. Portable drill and hammer drill

1. Always remove chuck key before starting drill

   (NOTE: The chuck key is the device used to lock the drill or tool into the chuck.)

2. Never attempt to use auger bits designed for a hand brace
3. Never attempt to stop drill by taking hold of chuck
4. Do not force drill into stock
5. On deep cuts, back drill out often to clean out hole
6. Never point drill at anyone

B. Screwdriver

1. Use correct type and size bit for screws being used
2. Never place screw point against any part of your body
3. Never hold your hand behind material into which you are driving the screw

INFORMATION SHEET

XXVII. Uses of a bench grinder (Figure 101)

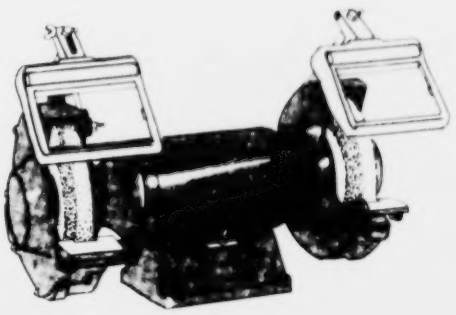
A. Sharpening tools

B. Grinding and shaping steel

C. Grinding burrs and rough places from steel

EXAMPLE:

FIGURE 101



XXVIII. Rules for safe use of bench grinders

A. Always use tool rest

B. Do not use grinder for woods or plastics

C. Never wear gloves when using bench grinder

D. Never use grinder with a cracked or damaged wheel

E. Never force stock into grinding wheel

F. Never use grinder to remove paint

XXIX. Uses of a portable power plane (Figure 102)

A. Straightening material

B. Face planing

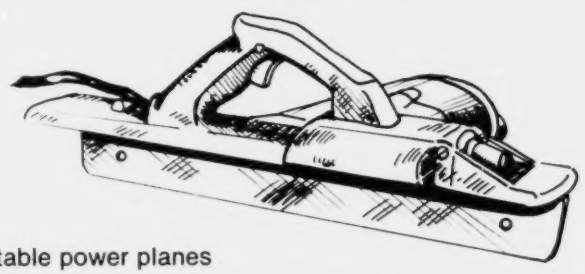
C. Edge planing

D. Chamfering

E. Beveling

EXAMPLE:

FIGURE 102



XXX. Rules for safe use of portable power planes

A. Be sure that stock is secure before planing

B. Keep hand or hands in proper location on plane

C. Always use a door jack when planing door edges

INFORMATION SHEET

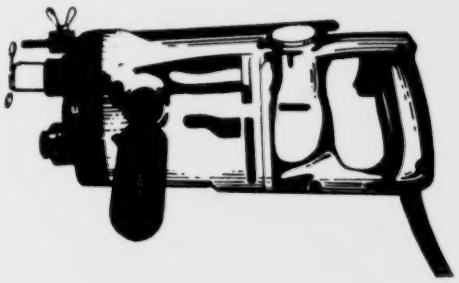
XXXI. Uses of a rotary hammer and a chipping hammer

A. Rotary hammer (Figure 103)

1. Drilling holes in masonry and concrete
2. Setting anchors
3. Performing light chipping

EXAMPLE:

FIGURE 103

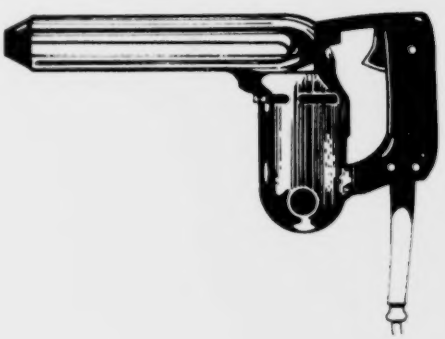


B. Chipping hammer (Figure 104)

1. Chipping masonry and concrete
2. Bushhammering concrete

EXAMPLE:

FIGURE 104



XXXII. Rules for safe use of rotary and chipping hammers

A. Never point hammer at anyone while it is running

B. Keep feet and hands clear of tool

C. Do not use point or chisel for prying

INFORMATION SHEET

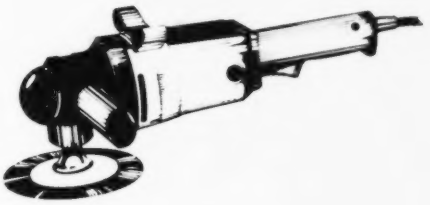
XXXIII. Uses of a portable angle grinder and a belt sander

A. Angle grinder (Figure 105)

1. Rough sanding
2. Grinding metal
3. Grinding concrete
4. Polishing and buffing
5. Removing rust and scale from steel
6. Wire brushing

EXAMPLE:

FIGURE 105

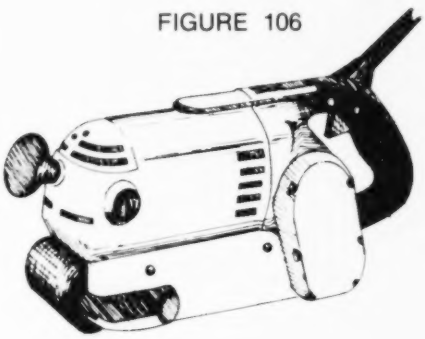


B. Belt sander (Figure 106)

1. Rough sanding
2. Smooth sanding
3. Grinding glass

EXAMPLE:

FIGURE 106



XXXIV. Rules for safe use of portable grinders and belt sanders

A. Angle grinder

1. Wear gloves when appropriate
2. Use proper grinding head for material being ground

   EXAMPLES: Head for steel, head for concrete
3. Be sure that grinder head has stopped turning before laying grinder down

B. Belt sander

1. Keep power cord away from sander belt
2. Hold sander firmly with both hands
3. Be sure that sander has stopped running before laying it down

INFORMATION SHEET

XXXV. Uses of pneumatic fasteners

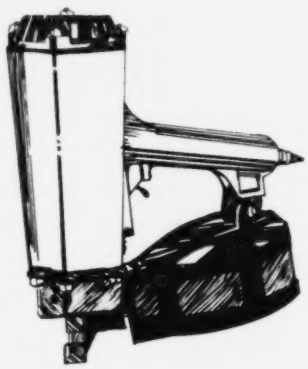
(NOTE: A pneumatic fastener is an air-powered tool that drives nails or staples.)

A. Nailer (Figure 107)

1. Applying sheathing
2. Applying decking
3. Installing framing
4. Installing finish work

EXAMPLE:

FIGURE 107

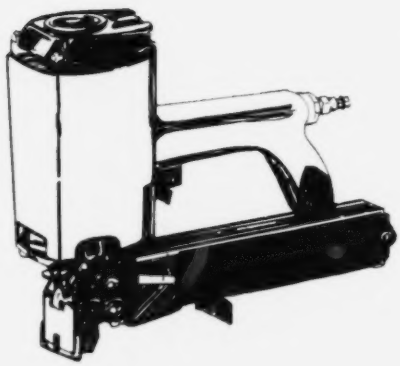


B. Stapler (Figure 108)

1. Applying sheathing
2. Applying decking
3. Applying roofing
4. Installing insulation
5. Installing ceiling tile
6. Installing paneling

EXAMPLE:

FIGURE 108



XXXVI. Rules for safe use of pneumatic fasteners

A. Use pressure specified by manufacturer

B. Use only nails or staples designed for fastener being used

C. Use caution when attaching fastener to air supply because fastener may discharge

INFORMATION SHEET

D. Keep hands and body away from discharge end of fastener

E. Do not discharge fasteners except when actually nailing or stapling

F. Never point fasteners at anyone

G. Never use fasteners on soft or thin material that nails may go through

XXXVII. Uses of a powder-actuated tool (Figure 109)

A. Driving pins and threaded studs

B. Fastening wood to concrete, masonry, and steel

C. Fastening steel to steel

D. Fastening steel to concrete

EXAMPLE:

FIGURE 109

XXXVIII. Rules for safe use of powder-actuated tools

CAUTION

Before using a powder-actuated tool, the operator must be certified and must possess a safety certification card.

A. Do not use powder-actuated tool until you are certified

(NOTE: See your instructor about certification.)

B. Follow *all* safety precautions in manufacturer's instruction manual

C. Always wear safety goggles and hard hat when operating tool

D. Use proper pin size for job you are performing

E. Use correct booster according to selector chart in toolbox

F. Never hold end of barrel against any part of your body, or cock tool against your hand

G. Never hold hand behind material you are fastening

H. Do not shoot close to edge of concrete

I. Never attempt to pry booster out of magazine with sharp instrument

J. Always wear ear protection in confined area

INFORMATION SHEET

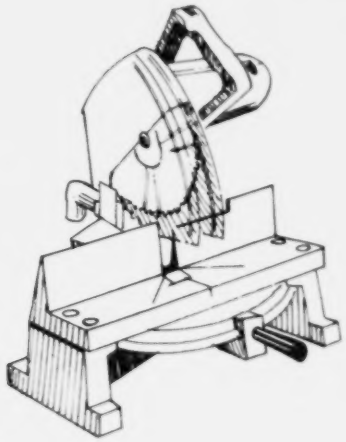
XXXIX. Uses of power miter saw (Figure 110)

A. Cutting straight miters

B. Crosscutting

EXAMPLE:

FIGURE 110



XL. Rules for safe use of power miter saws

A. Do not attempt to cut oversized stock

B. Enlist a helper to support end of long stock

C. Turn off motor immediately after making cut

CARPENTRY TOOLS
UNIT II

ASSIGNMENT SHEET #1 — COMPLETE A SAFETY TEST FOR SPECIFIC POWER TOOLS

NAME _____ SCORE _____

To operate a power tool correctly, you must know not only the operating instructions but also the specific safety rules for that tool. Before you will be allowed to operate any power tool, you must be able to show that you can operate the tool safely.

Complete the safety rules for each of the following pieces of equipment. Write your answers in the blanks.

A. Bench grinder

1. Always use tool _____
2. Do not use grinder for _____ or _____
3. Never wear _____ when using bench grinder

B. Power miter saw

1. Do not attempt to cut _____ stock
2. Enlist a _____ to support end of long stock
3. Turn off motor _____ after making cut

C. Portable angle grinder

1. Wear gloves when _____
2. Be sure that grinder head has stopped _____ before _____ grinder down

D. Portable belt sander

1. Keep power _____ away from sander _____
2. Hold sander firmly with _____ _____

E. Portable circular saw

1. Be sure that automatic guard is _____ and _____
2. _____ blade only _____ enough to cut through stock
3. Lay saw on its _____ after finishing the cut

ASSIGNMENT SHEET #1

F. Portable reciprocating saw and jigsaw

1. _____ _____ motor immediately after finishing the cut
2. Do not _____ blade into stock

G. Portable band saw

1. Use _____ blade size to avoid _____
2. Use _____ blade for job being done

H. Router and trimmer

1. Be sure that stock is _____ properly before routing
2. Always use a _____ _____ when routing for door _____
3. Always use _____ and _____ with router; never rout or plow _____

I. Portable drill and hammer drill

1. Always remove _____ _____ before starting drill
2. Never attempt to _____ drill by taking hold of _____
3. Never _____ drill at anyone

J. Portable screwdriver

1. Use correct _____ and _____ bit for screws being used
2. Never place _____ _____ against any part of your _____
3. Never hold your _____ behind the _____ into which you are _____ the screw

K. Portable power plane

1. Be sure that stock is _____ before planing
2. Keep _____ or _____ in proper _____ on plane
3. Always use a _____ _____ when planing door _____

ASSIGNMENT SHEET #1

L. Rotary and chipping hammer

1. Never _____ hammer at anyone while it is _____
2. Do not use point or chisel for _____

M. Pneumatic fastener

1. Use _____ specified by manufacturer
2. Use only nails or staples _____ for fastener being used
3. Use caution when attaching fastener to _____ _____ because fastener may _____
4. Keep hands and body away from _____ end of fastener
5. Do not _____ fasteners except when actually _____ or _____
6. Never use fasteners on _____ or _____ material that nails may go through

N. Powder-actuated tool

1. Do not use powder-actuated tool until you are _____
2. Use _____ pin size for job you are performing
3. Use correct booster according to _____ _____ in tool-box
4. Never hold end of barrel against any _____ of your _____, or cock tool against your _____
5. Never hold _____ behind _____ you are fastening
6. Never attempt to _____ booster out of magazine with _____ instrument

CARPENTRY TOOLS
UNIT II

ANSWERS TO ASSIGNMENT SHEET

Assignment Sheet #1

A. Bench grinder
   1. Rest
   2. Woods, plastics
   3. Gloves

B. Power miter saw
   1. Oversized
   2. Helper
   3. Immediately

C. Portable angle grinder
   1. Appropriate
   2. Turning, laying

D. Portable belt sander
   1. Cord, belt
   2. Both hands

E. Portable circular saw
   1. Free, rectractable
   2. Set, deep
   3. Side

F. Portable reciprocating saw
   1. Turn off
   2. Force

G. Portable band saw
   1. Proper, breakage
   2. Correct

H. Router and trimmer
   1. Secured
   2. Door jack, hinges
   3. Jigs, guides, freehand

I. Portable drill and hammer drill
   1. Chuck key
   2. Stop, chuck
   3. Point

J. Portable screwdriver
   1. Type, size
   2. Screw point, body
   3. Hand, material, driving

K. Portable power plane
   1. Secure
   2. Hand, hands, location
   3. Door jack, edges

L. Rotary and chipping hammer
   1. Point, running
   2. Prying

M. Pneumatic fastener
   1. Pressure
   2. Designed
   3. Air supply, discharge
   4. Discharge
   5. Discharge, nailing, stapling
   6. Soft, thin

N. Powder-actuated tool
   1. Certified
   2. Proper
   3. Selector chart
   4. Part, body, hand
   5. Hand, material
   6. Pry, sharp

CARPENTRY TOOLS
UNIT II

TEST

NAME _____ SCORE _____

1. Match terms associated with hand tools to their correct definitions. Write the correct numbers in the blanks.

_____a. Strip of wood, plastic, or metal used for decorative purposes

_____b. Device for guiding a backsaw at the proper angle for cutting a miter joint in wood

_____c. Place where two or more surfaces meet

_____d. Cut made at an angle for joining two pieces of wood so that they will form an angle

_____e. Soft stone having a soapy feel; used for marking metal

_____f. Instrument for laying out angles

_____g. Edge of board beveled at 45-degree angle; may be angular or curved

_____h. Ornamental pattern

_____i. Rabbet or groove cut in wood

_____j. Cut-out area or depression made to receive something such as hinges on doors

1. Mortise
2. Soapstone
3. Molding
4. Miter box
5. Miter
6. Joint
7. Fret
8. Protractor
9. Dado
10. Chamfer

2. State seven guidelines for care and safe use of hand tools.

a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

g. _____

TEST

3. Select from the following list hand tools a beginning carpenter needs. Write an "X" in the blank before each correct answer.

_____a. Hand brace and bit
_____b. Pliers
_____c. Hammer
_____d. Level
_____e. Square
_____f. Standard screwdrivers
_____g. Plane
_____h. Handsaw
_____i. Adjustable wrench
_____j. Scratch awl
_____k. Hacksaw
_____l. Rule or tape
_____m. Phillips screwdrivers
_____n. File
_____o. Chalk line
_____p. Combination set
_____q. Fret
_____r. Draw knife
_____s. Chisel
_____t. Utility knife
_____u. Bow saw
_____v. Ripping or pry bar
_____w. One-hundred-foot tape
_____x. Magnetic nail driver

4. Match types of hammers to their correct uses. Write the correct numbers in the blanks.

_____a. Used to drive nails, pull nails, dismantle, and wreck
_____b. Used to drive and pull nails

1. Curved-claw hammer
2. Straight-claw hammer

5. Match types of handsaws to their correct uses. Write the correct numbers in the blanks. Handsaws and their uses continue on the next page.

_____a. Used to cut curves and to shape ends of molding and trim for joints
_____b. Used to cut across the grain of wood
_____c. Used to cut fine joints; also used in a miter box to cut miters or square ends

1. Backsaw (miter-box saw)
2. Coping saw
3. Crosscut saw

TEST

_____d. Used to cut metal

_____e. Used to cut with the grain of wood

_____f. Used to cut inside corners, curves, circles, and frets

_____g. Used to cut smoothest possible joints (tenons, mortises, etc.)

4. Hacksaw
5. Dovetail saw
6. Compass saw (key-hole saw)
7. Ripsaw

6. Match types of squares to their correct uses. Write the correct numbers in the blanks.

_____a. Used to measure and check 45-degree and 90-degree angles

_____b. Used in general framing to lay out walls, partitions, rafters, braces, and stairs

_____c. Used to measure or transfer angles from 0 degree to 180 degrees and to check miter cuts

_____d. Used to check squareness and to mark 45-degree miters

_____e. Used to mark and check angles

1. Framing square (rafter square)
2. Combination square
3. Try square
4. Sliding T-bevel
5. Triangular rafter square

7. Match types of planes to their correct uses. Write the correct numbers in the blanks.

_____a. Used to plane small work to a smooth and even surface without taking off too much material

_____b. Used to plane and true long boards such as edges of wood doors

_____c. Used to plane rough work to produce a fairly smooth surface

_____d. Used to plane small pieces, edges, joint surfaces, and grain or cross grain when a small amount of change is required

1. Jack plane
2. Block plane
3. Smoothing plane
4. Jointer plane

8. Match types of measuring instruments to their correct uses. Write the correct numbers in the blanks.

_____a. Used to measure irregular as well as regular shapes and to make accurate inside measurements

_____b. Used to make accurate inside measurements

1. Folding rule (zigzag rule)
2. Flexible steel tape

TEST

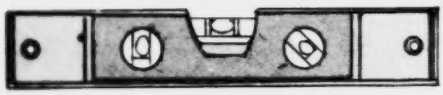
9. Identify the types of layout instruments illustrated below. Write the correct names in the blanks.

Spirit level
Torpedo level
Line level
Plumb bob

a. _____

b. _____

c. _____



d. _____

10. Identify the types of boring and drilling hand tools illustrated below. Write the correct names in the blanks. Illustrations continue on the next page.

Hand brace
Power bit (flat bit, speed bit)
Expansive bit (expansion bit)
Auger bit
Hand drill (eggbeater)
Twist drill (spiral drill)
Lockset bit
Push drill (automatic drill)
Hole saw

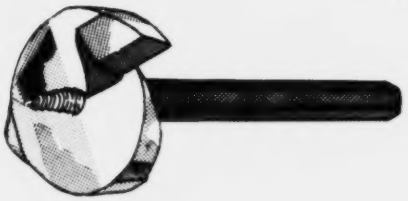
a. _____

b. _____

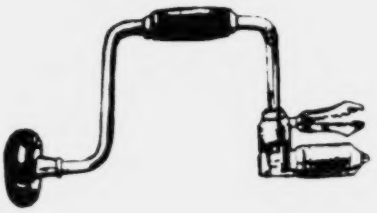
c. _____

d. _____

TEST

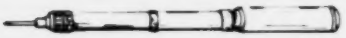


e. _____



f. _____

g. _____

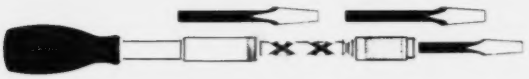


h. _____

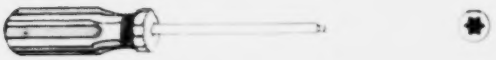
i. _____

11. Identify the types of screwdrivers illustrated below. Write the correct names in the blanks. Illustrations continue on the next page.

Torx-head screwdriver
Standard screwdriver (flat-blade screwdriver)
Clutch-head screwdriver
Phillips screwdriver
Standard screwdriver bit
Standard offset screwdriver
Spiral ratchet screwdriver (automatic screwdriver)
Square-head screwdriver (Robertson screwdriver)
Phillips offset screwdriver
Phillips screwdriver bit



a. _____

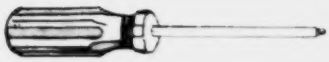


b. _____

c. _____

d. _____

TEST



e. _____

f. _____

g. _____

h. _____

i. _____

j. _____

12. Match types of pliers to their correct uses. Write the correct numbers in the blanks.

_____a. Used to hold and turn small round parts	1. Channel-lock pliers
_____b. Used to hold and turn large round parts	2. Combination slip-joint pliers
_____c. Used to hold and bend thin wire and metal fittings and to hold small objects in tight places	3. Needle-nose pliers
_____d. Used to hold, bend, shape, and cut wire	4. Side-cutting pliers

13. Identify the types of wrenches illustrated below. Write the correct names in the blanks. Illustrations continue on the next page.

Open-end wrench
Box-end wrench
Combination wrench
Adjustable wrench
Pipe wrench
Allen wrench (hex-key wrench)
Ratchet wrench and socket

a. _____

b. _____

TEST

c. _____

d. _____

e. _____

f. _____

g. _____

14. Identify the types of files illustrated below. Write the correct names in the blanks.

Cant saw **Slitting** **Square** **Knife**
Half-round **Round** **Flat** **Triangular (three-square)**

a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

TEST

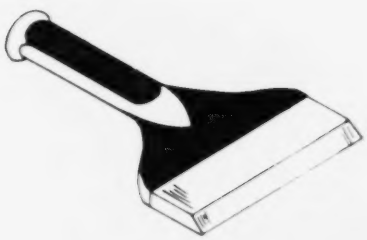
g. _____ h. _____

15. Identify the types of chisels illustrated below. Write the correct names in the blanks.

Wood chisel
Cold chisel
Brick chisel
Stripping chisel
Floor chisel (straight-blade chisel)
Ripping chisel

a. _____ b. _____

c. _____ d. _____

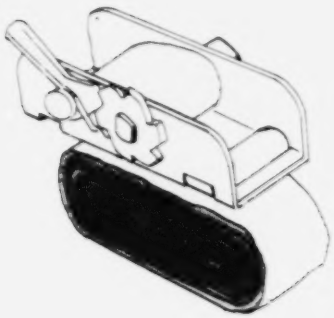


e. _____ f. _____

TEST

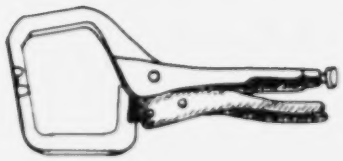
16. Identify the types of clamps illustrated below. Write the correct names in the blanks.

Bar clamp
C-clamp
Hand-screw clamp
Locking C-clamp
Spring clamp
Web clamp (strap clamp)

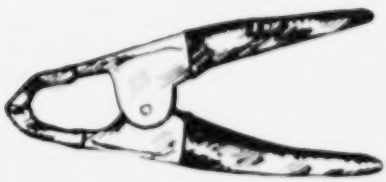


a. _____

b. _____

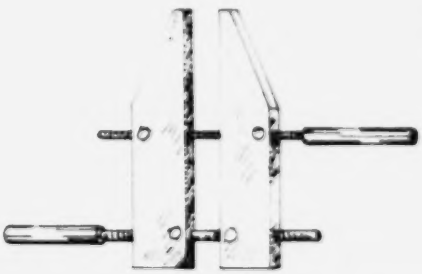


c. _____



d. _____

e. _____



f. _____

TEST

17. Match types of miscellaneous hand tools to their correct uses. Write the correct numbers in the blanks.

_____a. Used to shape and finish wood

_____b. Used to mark for position and thickness of the butt hinges on doors and door casings, and to mark location of lock plates and strike plates

_____c. Used to hone the final keen edge on tools with cutting edges

_____d. Used to pull nails

_____e. Used to scrape and apply putty and wood fillers

_____f. Used to sink a nail below the surface

_____g. Used to cut lightweight metal

_____h. Used to lay out an arc or circle, to step off measurements, and to divide distances along a straight line

_____i. Used to hold a workpiece while planing or trimming

_____j. Used to form an internal screw thread

_____k. Used with a framing square to lay out correct angle of riser height and tread run for each step on stair carriage

1. Butt gauge
2. Divider and scribe
3. Nail claw
4. Nail set
5. Oilstone
6. Putty knife
7. Stair gauge
8. Tap and tap wrench
9. Tin snips
10. Wood rasp
11. Woodworker's vise

18. State seven general safety rules pertaining to power tools.

a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

g. _____

TEST

19. Select from the following list general guidelines for proper care of power tools. Write an "X" in the blank before each correct answer.

_____a. Keep machine surfaces clean and oiled

_____b. Keep all tool accessories, such as blades and bits, sharp

_____c. Inspect tools and accessories yearly

_____d. Keep tools clean and in good working order

_____e. *Do not* follow manufacturer's maintenance procedures

_____f. Report any unusual noises, sounds, or vibrations to the instructor or supervisor

_____g. Use appropriate blade for the job being done, even if it is not the correct size for the arbor

_____h. Protect cutting edges

_____i. Keep tools in your trunk or in back of pickup when not in use

20. Select from the following list portable power tools used by carpenters. Write an "X" in the blanks before each correct answer.

_____a. Pneumatic wrench

_____b. Belt sander

_____c. Power plane

_____d. Jointer

_____e. 3/8" drill

_____f. Rotary hamer

_____g. Bench grinder

_____h. Saw buck

_____i. Angle grinder

_____j. Miter saw

_____k. Powder actuated tool

_____l. Belt sander

_____m. Chipping hammer

_____n. Metal shears

_____o. Pneumatic stapler

_____p. Bond saw

_____q. Screwdriver

_____r. Welder

_____s. Jig saw

_____t. Pneumatic nailer

TEST

21. Distinguish among uses of portable power saws. Write a "C" in the blanks before uses of circular saws, an "R" in the blanks before uses of reciprocating saws, a "J" in the blanks before uses of jigsaws, and a "B" in blanks before uses of band saws. Some blanks may contain more than one answer.

_____a. Crosscutting

_____b. Ripping

_____c. Cutting pipe

_____d. Making curves and scroll cuts

_____e. Making irregular cuts

_____f. Making miter cuts

_____g. Cutting angle iron and steel rods

_____h. Making bevel cuts

_____i. Making pocket cuts

_____j. Making inside curves and corner cuts

_____k. Cutting metal studs

_____l. Making relief cuts

22. State rules for safe use of the following portable power saws.

Circular saw (State four rules.)

a. _____

b. _____

c. _____

d. _____

Reciprocating saw and jigsaw (State two rules.)

a. _____

b. _____

Band saw (State two rules.)

a. _____

b. _____

23. Distinguish between uses of a router and a trimmer. Write an "R" in the blanks before uses of a router, and a "T" in the blanks before uses of a trimmer.

_____a. Cutting obtuse and acute angles

_____b. Dadoing, fluting, and reeding

_____c. Flush trimming

_____d. Rabbeting

_____e. Bevel trimming

_____f. Shaping edges

_____g. Dovetailing

_____h. Cutting laminate

_____i. Beveling

_____j. Mortising

TEST

24. State three rules for safe use of routers and trimmers.

a. _____

_____

b. _____

_____

c. _____

_____

25. Distinguish among uses of a portable drill, screwdriver, and hammer drill. Write a "D" in the blanks before uses of a drill, an "S" before uses of a screwdriver, and an "H" before uses of a hammer drill. A blank may contain more than one answer.

_____a. Setting anchors

_____b. Boring and drilling

_____c. Drilling holes in masonry and concrete

_____d. Driving and removing lag bolts

_____e. Driving screws

_____f. Drilling holes in wood and other materials

_____g. Cutting holes with hole saw

_____h. Performing light chipping work

_____i. Driving and removing wood screws

_____j. Mixing materials

_____k. Driving and removing machine screws

_____l. Driving and removing thread-cutting screws

26. State rules for safe use of portable drills, screwdrivers, and hammer drills.

Portable drill and hammer drill (State four rules.)

a. _____

b. _____

c. _____

d. _____

Screwdriver (State two rules.)

a. _____

b. _____

TEST

27. Select from the following list uses of a bench grinder. Write an "X" in the blank before each correct use.

_____a. Sharpening saw blades

_____b. Removing paint from steel

_____c. Smoothing mitered edges of trim

_____d. Grinding burrs and rough places from steel

_____e. Grinding and shaping steel

_____f. Sharpening tools

28. State three rules for safe use of bench grinders.

a. _____

b. _____

c. _____

29. Select from the following list uses of a portable power plane. Write an "X" in the blank before each correct use.

_____a. Mitering

_____b. Chamfering

_____c. Straightening material

_____d. Beveling

_____e. Edge planing

_____f. Face planing

30. State two rules for safe use of portable power planes.

a. _____

b. _____

31. Distinguish between uses of a rotary hammer and a chipping hammer. Write an "R" in the blanks before uses of a rotary hammer, and a "C" in the blanks before uses of a chipping hammer.

_____a. Chipping masonry and concrete

_____b. Setting anchors

_____c. Bushhammering concrete

_____d. Performing light chipping

_____e. Drilling holes in masonry and concrete

32. State two rules for safe use of rotary and chipping hammers.

a. _____

b. _____

TEST

33. Distinguish between uses of a portable angle grinder and a belt sander. Write an "AG" in the blanks before uses of an angle grinder, and a "BS" in the blanks before uses of a belt sander. Some blanks may contain more than one answer.

_____a. Grinding metal

_____b. Polishing and buffing

_____c. Grinding glass

_____d. Smooth sanding

_____e. Grinding concrete

_____f. Rough sanding

_____g. Wire brushing

_____h. Removing rust and scale from steel

34. State rules for safe use of portable angle grinders and belt sanders.

Angle grinder (State two rules.)

a. _____

b. _____

Belt sander (State two rules.)

a. _____

b. _____

35. Distinguish between uses of pneumatic fasteners. Write an "N" in the blanks before uses of nailers, and an "S" in the blanks before uses of staplers. Some blanks may contain more than one correct answer.

_____a. Applying decking

_____b. Installing finish work

_____c. Applying sheathing

_____d. Applying roofing

_____e. Installing paneling

_____f. Installing ceiling tile

_____g. Installing framing

_____h. Installing insulation

36. State three rules for safe use of pneumatic fasteners.

a. _____

_____

b. _____

_____

c. _____

_____

TEST

37. Select from the following list uses of a powder-actuated tool. Write an "X" in the blank before each correct use.

_____a. Fastening steel to steel

_____b. Fastening studs to plates

_____c. Driving pins and threaded studs

_____d. Installing flooring

_____e. Fastening wood to concrete, masonry, and steel

_____f. Fastening steel to concrete

38. State rules for safe use of powder-actuated tools.

a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

g. _____

h. _____

i. _____

j. _____

39. Select from the following list uses of a power miter saw. Write an "X" in the blanks before each correct use.

_____a. Crosscutting

_____b. Making relief cuts

_____c. Cutting miters on pipe

_____d. Make pocket cuts

_____e. Cutting straight miters

_____f. Ripping

40. State two rules for safe use of power miter saws.

a. _____

b. _____

CARPENTRY TOOLS
UNIT II

ANSWERS TO TEST

1. a. 3
   b. 4
   c. 6
   d. 5
   e. 2
   f. 8
   g. 10
   h. 7
   i. 9
   j. 1

2. Answers should include any seven of the following

   a. Use the correct tool for the job
   b. Keep tools sharp
   c. Keep tools clean
   d. Inspect tools frequently to make sure they are in good condition
   e. Repair broken or damaged tools promptly
   f. Dispose of broken or damaged tools that cannot be repaired
   g. Store tools properly when not in use
   h. Stay alert when using tools
   i. Wear eye protection when necessary

3. a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, s, t, v, w

4. a. 2
   b. 1

5. a. 2
   b. 3
   c. 1
   d. 4
   e. 7
   f. 6
   g. 5

6. a. 3
   b. 1
   c. 4
   d. 2
   e. 5

7. a. 3
   b. 4
   c. 1
   d. 2

8. a. 2
   b. 1

9. a. Line level
   b. Spirit level
   c. Plumb bob
   d. Torpedo level

10. a. Expansive bit (expansion bit)
    b. Hand drill (eggbeater)
    c. Power bit (flat bit, speed bit)
    d. Auger bit

ANSWERS TO TEST

e. Lockset bit
f. Hand brace
g. Twist drill (spiral drill)
h. Push drill (automatic drill)
i. Hole saw

11. a. Spiral ratchet screwdriver (automatic screwdriver)
b. Torx-head screwdriver
c. Standard screwdriver (flat-blade screwdriver)
d. Clutch-head screwdriver
e. Square-head screwdriver (Robertson screwdriver)
f. Phillips screwdriver
g. Phillips offset screwdriver
h. Standard screwdriver bit
i. Phillips screwdriver bit
j. Standard offset screwdriver

12. a. 2
b. 1
c. 3
d. 4

13. a. Pipe wrench
b. Open-end wrench
c. Allen wrench (hex-key wrench)
d. Box-end wrench
e. Adjustable wrench
f. Combination wrench
g. Ratchet wrench and socket

14. a. Slitting
b. Cant saw
c. Knife
d. Round
e. Triangular (three-square)
f. Flat
g. Square
h. Half-round

15. a. Stripping chisel
b. Ripping chisel
c. Cold chisel
d. Wood chisel
e. Brick chisel
f. Floor chisel (straight-blade chisel)

16. a. Web clamp (strap clamp)
b. C-clamp
c. Locking C-clamp
d. Spring clamp
e. Bar clamp
f. Hand-screw clamp

17.
a. 10
b. 1
c. 5
d. 3
e. 6
f. 4
g. 9
h. 2
i. 11
j. 8
k. 7

ANSWERS TO TEST

18. Answer should include any seven of the following

a. Do not attempt to operate any power tool before being checked out by instructor on that particular tool
b. Always wear eye protection and hard hat when operating a power tool
c. Wear appropriate clothing for job being done
d. Do not distract others or let anyone distract you while operating a power tool
e. Do not leave power tool running unattended
f. Assume a safe and comfortable position before using a power tool
g. Be sure that power tool is properly grounded before using
h. Be sure that power tool is disconnected before performing maintenance or changing accessories
i. Do not use dull or broken tool or accessories
j. Use a power tool only for its intended use
k. Keep feet, fingers, and hair away from the blade and other moving parts of a power tool
l. Do not use a power tool with guards or safety devices removed
m. Do not operate a power tool if hands or feet are wet
n. Keep work area clean at all times
o. Before attempting to use it, be familiar with the correct operation and adjustments of power tool
p. Keep a firm grip on the power tool at all times
q. Use grounded electric extension cords of sufficient size to service particular power tool you are using

19. b, d, f, h

20. b, c, e, f, g, i, j, k, l, m, o, p, q, s, t

21.

a.	C, R, J	d.	J	g.	B	j.	R, J
b.	C, J	e.	R	h.	C	k.	B
c.	B	f.	C	i.	C, R, J	l.	R, J

22. **Circular saw** (Answer should include any four of the following)

a. Keep electric cord clear of blade to avoid cutting cord
b. Be sure that automatic guard is free and retractable
c. Check stock for nails and any other metal before cutting
d. Use a good, solid support for stock while cutting
e. Allow saw to gain maximum speed before starting cut
f. Set blade only deep enough to cut through stock
g. Lay saw on its side after finishing the cut

Reciprocating saw and jigsaw (Answer should include any two of the following)

a. Keep electric cord clear of blade to avoid cutting cord
b. Use the correct blade for the job being done
c. Do not force blade into stock
d. Turn off motor immediately after finishing the cut

ANSWERS TO TEST

Band saw (Answer should include any two of the following)

a. Use proper blade size to avoid breakage
b. Use correct blade for job being done
c. Do not force blade into stock

23.

a.	T	f.	R
b.	R	g.	R
c.	T	h.	T
d.	R	i.	R
e.	T	j.	R

24. Answer should include any three of the following

a. Avoid making cuts too deep for tool being used
b. Be sure that stock is secured properly before routing
c. Always use a door jack when routing for door hinges
d. Always use jigs and guides with router; never rout or plow freehand
e. When using a router or trimmer, approach workpiece gently; never gouge bit into stock

25.

a.	H	d.	S	g.	D	j.	D, H
b.	D	e.	D	h.	H	k.	S
c.	H	f.	H	i.	S	l.	S

26. **Portable drill and hammer drill** (Answer should include any four of the following)

a. Always remove chuck key before starting drill
b. Never attempt to use auger bits designed for a hand brace
c. Never attempt to stop drill by taking hold of chuck
d. Do not force drill into stock
e. On deep cuts, back drill out often to clean out hole
f. Never point drill at anyone

Screwdriver (Answer should include two of the following)

a. Use correct type and size bit for screws being used
b. Never place screw point against any part of your body
c. Never hold your hand behind material in which you are driving the screw

27. d, e, f

28. Answer should include any three of the following

a. Always use tool rest
b. Do not use grinder for woods or plastics

ANSWERS TO TEST

c. Never wear gloves when using bench grinder
d. Never use grinder with a cracked or damaged wheel
e. Never force stock into grinding wheel
f. Never use grinder to remove paint

29. b, c, d, e, f

30. Answer should include any two of the following

a. Be sure that stock is secure before planing
b. Keep hand or hands in their proper location on plane
c. Always use a door jack when planing door edges

31.
a. C		d. R	
b. R		e. R	
c. C			

32. Answer should include any two of the following

a. Never point hammer at anyone while it is running
b. Keep feet and hands clear of tool
c. Do not use point or chisel for prying

33.
a. AG		c. BS		e. AG		g. AG	
b. AG		d. BS		f. AG, BS		h. AG	

34. Answer should include any two for each of the following

Angle grinder

a. Wear gloves when appropriate
b. Use proper grinding head for material being ground
c. Be sure that grinder head has stopped turning before laying grinder down

Belt sander

a. Keep power cord away from sander belt
b. Hold sander firmly with both hands
c. Be sure that sander has stopped running before laying it down

35.
a. N, S		e. S	
b. N		f. S	
c. N, S		g. N	
d. S		h. S	

ANSWERS TO TEST

36. Answer should include any three of the following

    a. Use pressure specified by manufacturer
    b. Use only nails or staples designed for fastener being used
    c. Use caution when attaching fastener to air supply because fastener may discharge
    d. Keep hands and body away from discharge end of fastener
    e. Do not discharge fasteners except when actually nailing or stapling
    f. Never point fasteners at anyone
    g. Never use fasteners on soft or thin material that nails may go through

37. a, c, e, f

38. a. Do not use powder-actuated tool until you are certified
    b. Follow *all* safety precautions in manufacturer's instruction manual
    c. *Always* wear safety goggles and hard hat when operating tool
    d. Use proper pin size for the job you are performing
    e. Use correct booster according to selector chart in toolbox
    f. Never hold end of barrel against any part of your body, or cock tool against your hand
    g. Never hold hand behind material you are fastening
    h. Do not shoot close to edge of concrete
    i. Never attempt to pry booster out of magazine with sharp instrument
    j. Always wear ear protection in confined area

39. a, e

40. Answer should include any two of the following

    a. Do not attempt to cut oversized stock
    b. Enlist a helper to support end of long stock
    c. Turn off motor immediately after making cut

CARPENTRY LAYOUT
UNIT III

UNIT OBJECTIVE

After completing this unit, the student should be able to identify parts of a framing square and should be able to lay out walls and ceiling joists. The students will show this ability by completing job sheets and unit test with a minimum score of 80 percent.

SPECIFIC OBJECTIVES

After completing this unit, the student should be able to

1. Match terms associated with layout to their correct definitions.
2. Select from a list types of tools needed for layout work.
3. Identify parts of a framing square.
4. Identify graduations on a framing square.
5. List common errors that contribute to inaccurate layout.
6. Identify framing members used in wall, partition, and ceiling framing.
7. Demonstrate ability to
   a. Use a framing square and rule to lay out an 8-inch wall corner.
   b. Use a hand level.
   c. Lay out wall and partition locations on floor.
   d. Lay out wall sections for a structure.
   e. Lay out ceiling joists.

CARPENTRY LAYOUT
UNIT III

SUGGESTED ACTIVITIES

I. Unit contents

A. Objective sheet

B. Suggested activities

C. Information sheet

D. Job sheets

1. Job Sheet #1 — Use a Framing Square and Rule to Lay Out an 8-Inch Wall Corner

2. Job Sheet #2 — Use a Hand Level

3. Job Sheet #3 — Lay Out Wall and Partition Locations on Floor

4. Job Sheet #4 — Lay Out Wall Sections for a Structure

5. Job Sheet #5 — Lay Out Ceiling Joists

E. Test

F. Answers to test

II. Instructor's guide

A. Review unit and plan presentation.

B. Obtain materials to supplement unit.

1. Competency profiles.

(NOTE: A master of the competency profile for this book is provided at the front of the instructor edition. You may duplicate the profile and distribute it to students as needed.)

2. Provide framing square, rule, tape, chalk box, pencil, and level for each student.

3. Provide each student with a framing square booklet, available from Stanley Tool Company.

SUGGESTED ACTIVITIES

C. Introduce unit.

- Tour a construction site where they are just starting to lay out walls and partitions.
- Have students observe the tools they are using and the methods used to lay out the walls.
- Emphasize to the students the importance of using the tools properly and accurately.

D. Provide students with objective sheet.

E. Discuss unit and specific objectives.

F. Provide students with information sheet.

G. Discuss information sheet.

1. Use Information Sheet, Section I, to discuss terms and definitions associated with layout.
   - Use samples of tools and models of construction members and/or plans to illustrate appropriate terms.
   - Explain the importance of knowing and understanding the use of tools and all their parts.
   - Explain the importance of knowing the framing members and understanding why and how they all go together.
2. Use Information Sheet, Sections II-IV, to discuss layout, tools needed, and parts of the framing square.
   - Provide students with each of the tools needed for layout work. Have them become familiar with each tool.
   - Demonstrate the use or uses of each tool.
   - Emphasize proper care of each of the tools, which includes using them only for their intended uses.
   - Go over the different parts of the framing square with the students and explain how each part is used in layout work.
   - Explain the different graduations on the framing square, and how and when they are used.
   - Demonstrate how the framing square should be held when used.

SUGGESTED ACTIVITIES

- Demonstrate the different uses of the framing square.

3. Use Information Sheet, Section V, to discuss common errors that contribute to inaccurate layout.

   - Review and discuss the errors listed in this section.
   - Have students try to come up with other ways errors may be made.
   - Demonstrate and explain how slack in a tape will make layout inaccurate.
   - Demonstrate to students how tapes, rules, and squares are not properly aligned.
   - Explain how easy it is to miss placing end of tape or rule on the correct reference point and how easy it is to read or record incorrect numbers.
   - Explain that doing layout with a dull point on a pencil may cause an error of an inch or more if the walls are long.
   - Demonstrate that if the framing square is not tight against workpiece, that the marks may be crooked and thus off throughout the layout work.
   - Again caution students to use tools properly and accurately.

4. Use Information Sheet, Section VI, to discuss framing members used in wall and ceiling framing.

   - Have students review this section, then take them on a field trip to a construction site where they will be able to see these members being put together.
   - Have the students study these framing members until they become familiar with them.
   - Explain that if the layout is incorrect, the framing will also be incorrect, causing the interior and exterior covering not to work out. Point out that because of the incorrect layout, the construction could become very expensive.

H. Provide students with job sheets.

I. Demonstrate job sheet procedures and allow students to practice the procedures.

   - Have students complete Job Sheets #1-#5.

SUGGESTED ACTIVITIES

J. Review unit.

K. Give test.

L. Critique test and discuss in class.

M. Reteach and retest as necessary.

N. Complete appropriate sections of competency profiles.

III. Unit reference

A. Hendrix, Laborn J. "Bud." *Fundamentals of Carpentry*. Stillwater, Oklahoma: State Department of Vocational and Technical Education/Curriculum and Instructional Materials Center, and the Associated General Contractors of America, 1985.

B. Hendrix, Laborn, J. "Bud." *Residential Carpentry*. Stillwater, Oklahoma: State Department of Vocational and Technical Education/Curriculum and Instructional Materials Center and the Associated General Contractors of America, 1985.

C. *Stanley Rafter and Framing Squares* S51-R54. New Britain, Connecticut: Stanley Tools, Division of the Stanley Works.

CARPENTRY LAYOUT
UNIT III

INFORMATION SHEET

I. Terms and definitions associated with layout

A. **Framing square** — Tool designed for layout work such as laying out stairs and determining length of rafters and pitch of roof

B. **Scales** — Divisions or graduations found on the outer and inner edges of the framing square

C. **Rafter tables** — Tables on the blade face of the framing square; used to determine lengths and cuts of rafters

D. **Eight square or octagon scale** — Table in the center of the tongue face of the framing square; used to lay out an eight-sided pattern

E. **Essex board measure table** — Table on back side of body of the rafter square; used to find contents in board measure of boards and timbers

F. **Brace measure table** — Table along center of back of the tongue of framing square; used to find lengths of common braces

G. **Slack** — Not tight or taut; sagging

H. **Partition** — Wall that subdivides space within a building

I. **Plates** — Lowest and highest structural members of a wall to which studs are nailed

J. **Studs** — Main vertical framing members in walls

K. **Blocking** — Wood block used as filler piece and support between framing members

L. **Header** — Horizontal structural member that supports the load over an opening such as a window or door

M. **Jamb** — Top and sides of a door or window frame that contact the door or window sash

EXAMPLES: Head jamb, side jambs

N. **Rough opening** — Opening in framing formed by framing members, such as openings for windows and doors

O. **Rough sill** — Lower framing member attached to top part of bottom cripple studs to form the base of a rough opening for a window

INFORMATION SHEET

II. Types of tools and equipment needed for layout work

A. Plans

B. Folding rule or steel tape

C. Two 100-foot tapes

D. Framing square

E. Chalk box and line

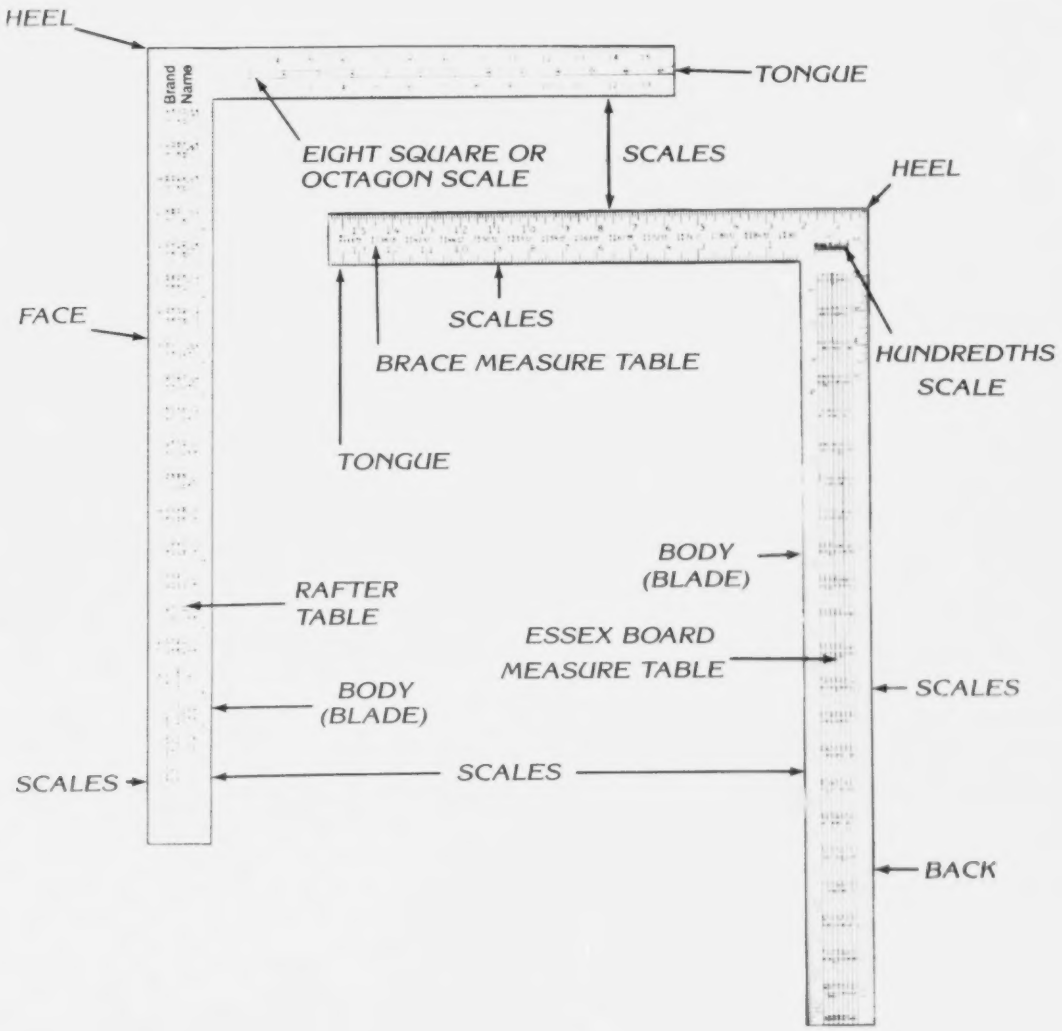
F. Pencil

G. Level

INFORMATION SHEET

III. Parts of a framing square (Figure 1)

FIGURE 1



INFORMATION SHEET

IV. Graduations on a framing square (See Figure 2)

A. Face of body

1. Outside edge—Sixteenths of an inch
2. Inside edge—Eighths of an inch

B. Face of tongue

1. Outside edge—Sixteenths of an inch
2. Inside edge—Eighths of an inch

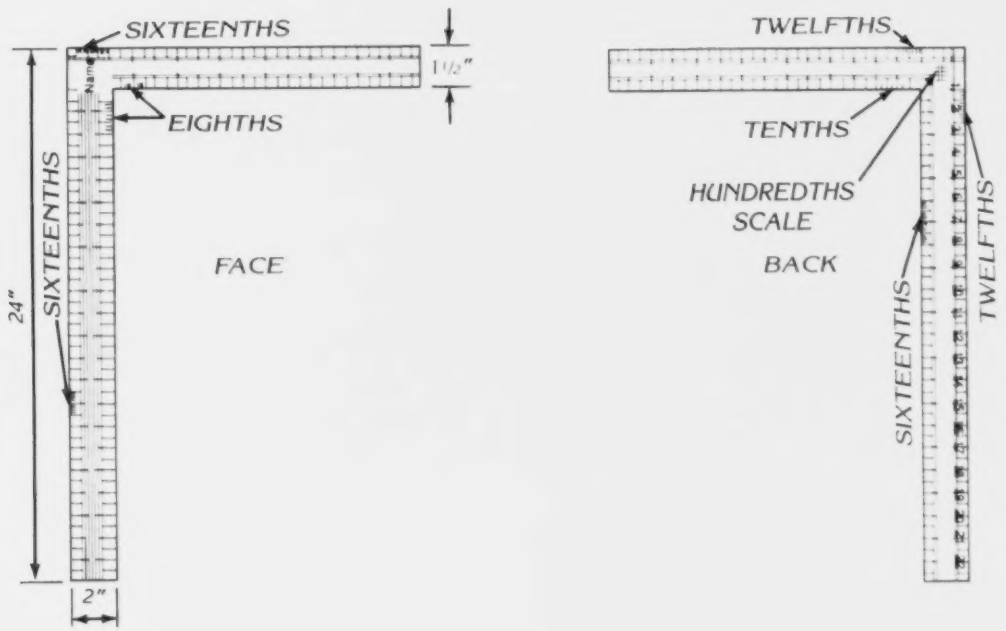
C. Back of body

1. Outside edge—Twelfths of an inch
2. Inside edge—Sixteenths of an inch

D. Back of tongue

1. Outside edge—Twelfths of an inch
2. Inside edge—Tenths of an inch

FIGURE 2



INFORMATION SHEET

V. Common errors that contribute to inaccurate layout

A. Leaving slack in tape

B. Not aligning tape, rule, or square properly

C. Not placing end of tape or rule on reference point

D. Reading and recording incorrect numbers

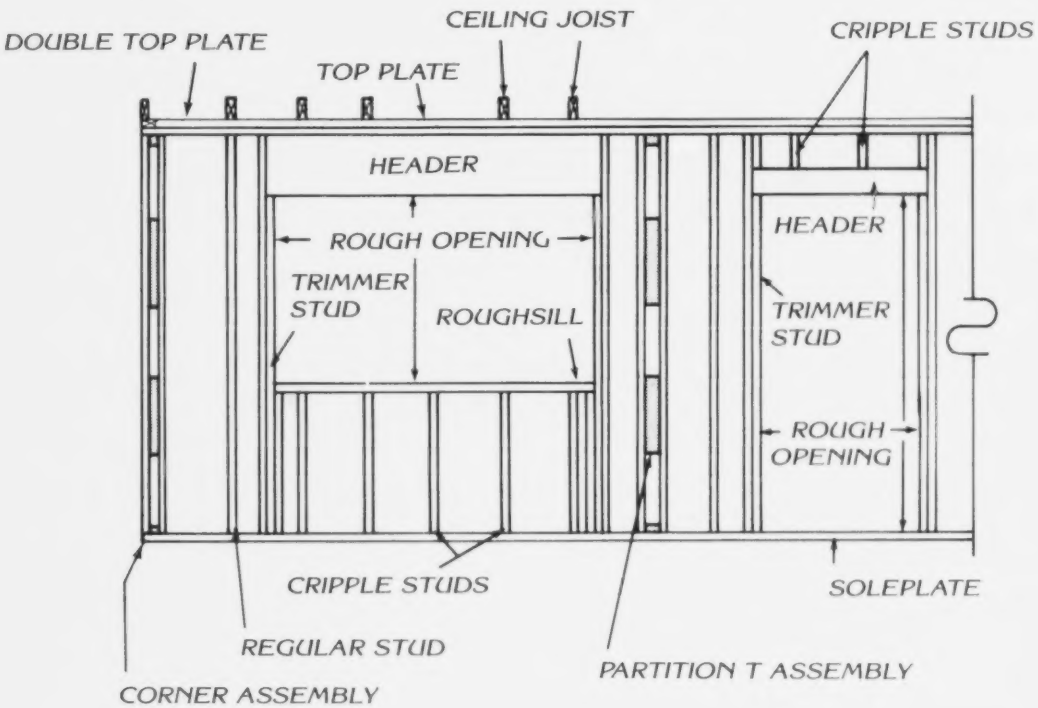
E. Using a dull pencil

F. Not keeping square tight against workpiece

G. Using the square backwards when laying out studs, joists, or rafters

VI. Wall, partition, and ceiling framing members (Figure 3)

FIGURE 3



CARPENTRY LAYOUT
UNIT III

JOB SHEET #1 — USE A FRAMING SQUARE AND RULE
TO LAY OUT AN 8-INCH WALL CORNER

I. Equipment and materials

A. Framing square

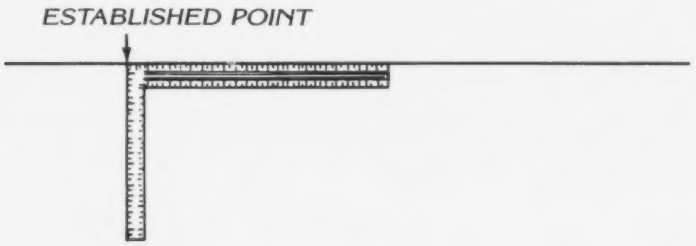
B. Pencil

C. Rule

II. Procedure

A. Use framing square to square off an established point on line (Figure 4)

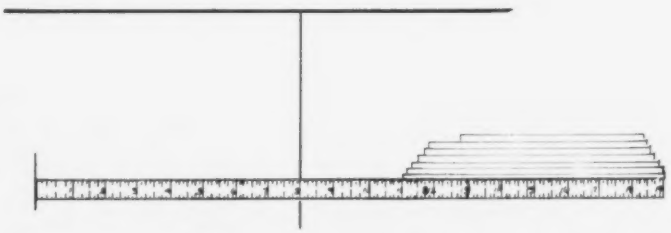
FIGURE 4



B. Mark line along edge of framing square to establish a square corner

C. Use rule to measure 8 inches from this line, and make a small mark (Figure 5)

FIGURE 5



JOB SHEET #1

D. Use framing square to square small mark with established line

E. Mark line along the edge of square

(NOTE: This establishes a square corner for an 8-inch wall.)

F. Recheck work

G. Put away tools and equipment

CARPENTRY LAYOUT
UNIT III

JOB SHEET #2 — USE A HAND LEVEL

I. Equipment and materials

A. Four-foot spirit level

B. Vertical and horizontal work surfaces

C. Pencil

D. Tape

E. Straightedge

II. Procedure for leveling

A. Check level for accuracy

(NOTE: Levels are very delicate instruments and must be handled carefully to ensure accuracy. Levels should be checked for accuracy before use, especially if the instrument has been dropped or jarred.)

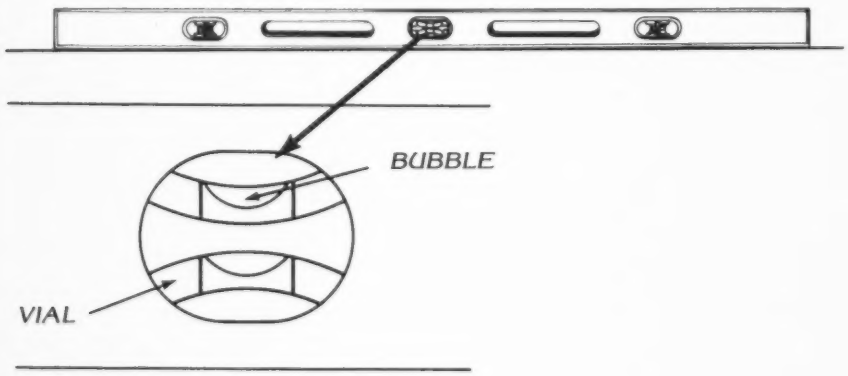
1. Set base of level on flat, horizontal surface

2. Check bubble position in horizontal vial

3. Adjust surface or location of level until bubble is centered; mark position on surface

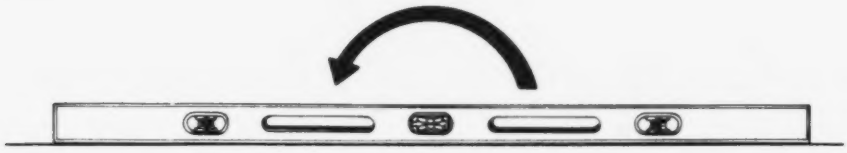
(NOTE: On a level surface, the bubble will lie evenly positioned between the lines on the vial. See Figure 6.)

FIGURE 6



4. Rotate the level end for end and position it on the exact location of the bubble-centered reading (Figure 7)

FIGURE 7



5. Check bubble position in the horizontal vial

   (NOTE: The bubble will be centered for this side also if the level is accurate.)

6. Replace or repair level as necessary

B. Level a surface

1. Visually check surface for irregularities and foreign matter such as dirt

   (NOTE: Even small surface irregularities or particles can cause inaccurate readings.)

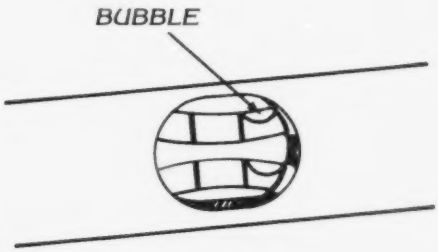
2. Clean or replace surface as necessary

3. Set base of level carefully and squarely on surface

4. Check bubble position

   (NOTE: The bubble will be displaced toward the high end of the level. Figure 8.)

FIGURE 8



JOB SHEET #2

5. Adjust surface as necessary

6. Take additional readings to level surface as required

   (NOTE: Many factors, such as the type of surface and the material being used, affect the number of readings that are required.)

III. Procedure for plumbing

A. Check level for accuracy

1. Place base of level against flat, vertical surface (See Figure 9)

2. Check bubble position in upper horizontal vial

3. Adjust surface or location of level until bubble is centered; mark position on surface

4. Rotate level end for end and position it on the exact location as that of the bubble-centered reading (Figure 10)

FIGURE 9

FIGURE 10

JOB SHEET #2

5. Check bubble position in the upper horizontal vial

   (NOTE: The bubble will be centered at this end also if level is accurate.)

6. Replace or repair level as necessary

B. Plumb a surface

1. Visually check surface for irregularities and foreign matter such as dirt

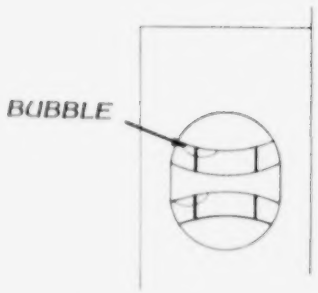
2. Clean or replace surface as necessary

3. Place base of level carefully and squarely against surface

4. Check bubble position in upper vial

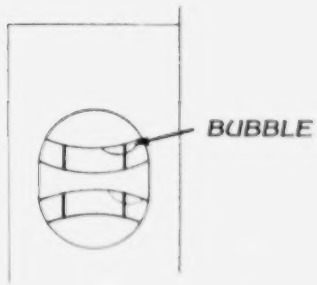
   (NOTE: The bubble will move toward one end of the vial if the surface is not plumb. To plumb the surface, you must adjust it in the direction of bubble displacement. See Figures 11 and 12.)

FIGURE 11



SURFACE SLANTS /

FIGURE 12



SURFACE SLANTS \

5. Adjust surface as necessary

6. Take additional readings to plumb as required

C. Clean work area; put away tools and equipment

CARPENTRY LAYOUT
UNIT III

JOB SHEET #3 — LAY OUT WALL AND PARTITION LOCATIONS ON FLOOR

I. Tools and materials

- A. Chalk line
- B. 100-foot tape
- C. Folding rule or steel tape
- D. Claw hammer
- E. Floor plan
- F. Framing square

II. Procedure

- A. Lay out outside walls
  1. Measure in the width of soleplate from the outside edge of the box sill on a wood floor or from the outside of the foundation on a slab floor; mark this distance

     (NOTE: On a wood floor, start a nail at each mark.)
  2. Stretch a chalk line between marks and snap line

     (NOTE: If laying off a slab floor, you will need a helper to hold the other end of the line. For a wood floor, fasten the line to the nails.)

     a. Make sure the line is sufficiently chalked

     b. Pull the line tight from one end

        (NOTE: Have helpers hold each end of the line or fasten it to the nails.)

     c. Place one thumb on the line approximately in the center

     d. Hold line firmly to the floor

     e. Carefully lift one side of the line with the other hand and let it snap to the floor

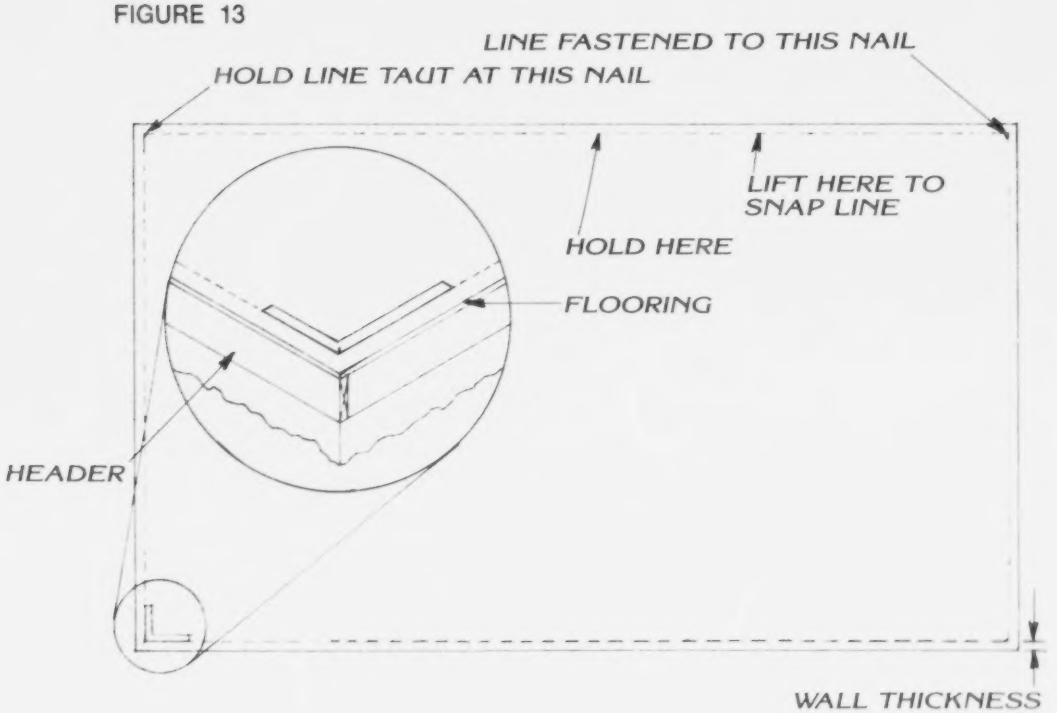
JOB SHEET #3

f. Repeat the procedures for the other half of line

(NOTE: This operation should result in a straight line that represents the inside face of the outside wall soleplate.)

3. Square off chalk line to mark other outside walls (Figure 13)

FIGURE 13



4. Check squareness, using 3-4-5 method

JOB SHEET #3

B. Lay out inside walls (See Figures 14 and 15)

(NOTE: Lay out all the walls running the length of the building first, then the ones running the width of the building.)

1. Mark one side of each partition on outside walls

(NOTE: Some floor plans are dimensioned by rooms, and some are dimensioned center to center on partitions.)

FIGURE 14

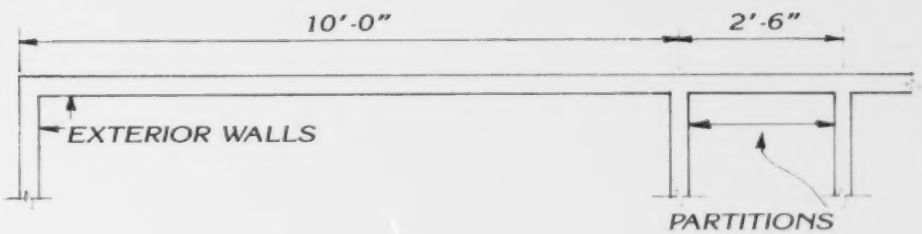
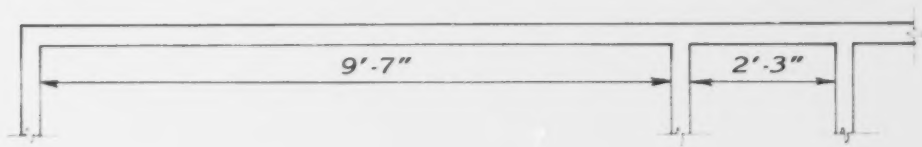


FIGURE 15



2. Mark width of soleplate
3. Square off from exterior wall mark
4. Stretch chalk line taut along length of partition and snap line
5. Repeat procedure for other side of wall
6. Continue steps to mark both sides of all partitions, using other partition marks to square partitions that do not meet exterior wall

C. Clean work area and put away tools and materials

CARPENTRY LAYOUT
UNIT III

JOB SHEET #4 — LAY OUT WALL SECTIONS FOR A STRUCTURE

I. Tools and materials

A. Folding rule or steel tape

B. Claw hammer

C. Framing square

D. 100-foot tape marked 16 inches on center

E. 16-foot-long plate material

F. 16d nails

II. Procedures

A. Tack soleplate end to top plate to floor side by side with ends flush (Figure 16)

(NOTE: Some carpenters prefer to tack plates together face to face and lay out studs on the edges of the plates.)

FIGURE 16

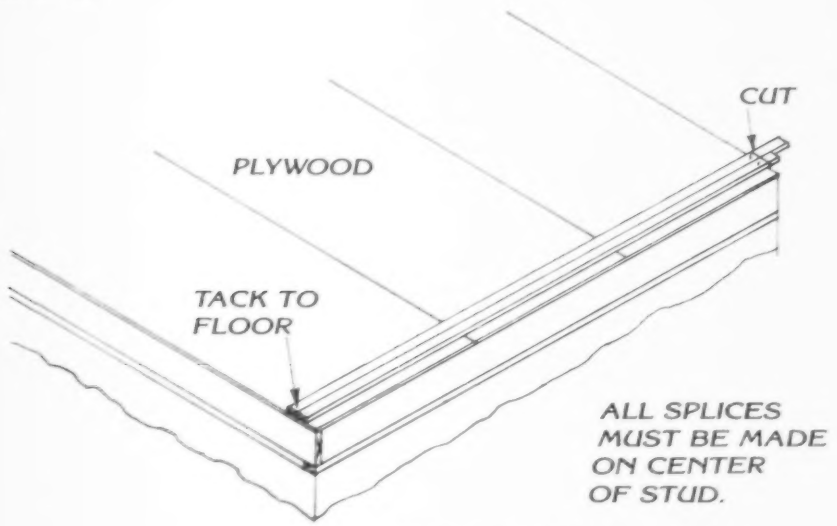


PLATE LAID OUT ON SUBFLOOR

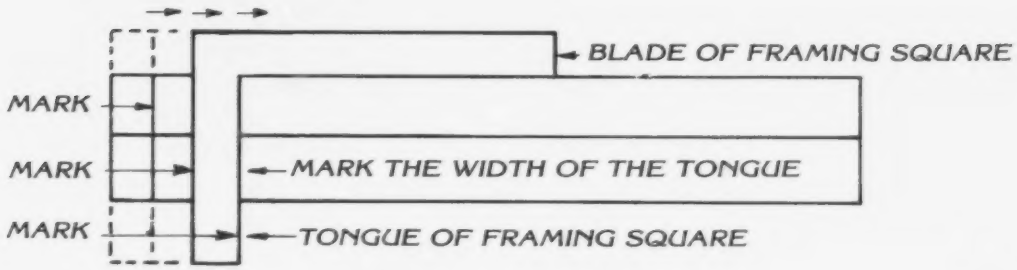
JOB SHEET #4

B. Lay off stud locations on plates, side walls first

(NOTE: Lay off all walls from left to right.)

1. Mark plates for corner (Figure 17)

FIGURE 17



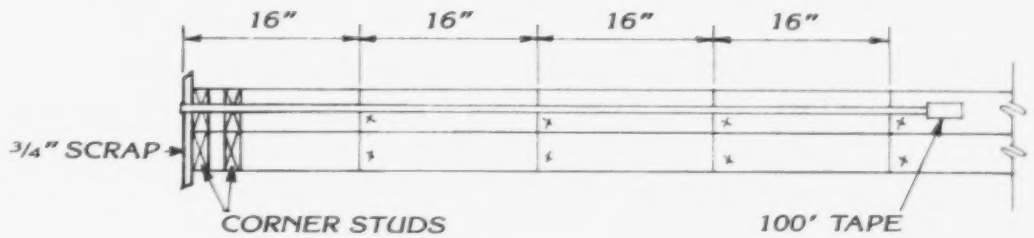
2. Use 100-foot tape to lay off all stud locations

   a. Place scrap of 3/4-inch material at left end of plates

   b. Hook end of tape over scrap piece and make a mark on the plates at stud intervals along tape

   c. Place a small "X" at the right of each mark (Figure 18)

FIGURE 18

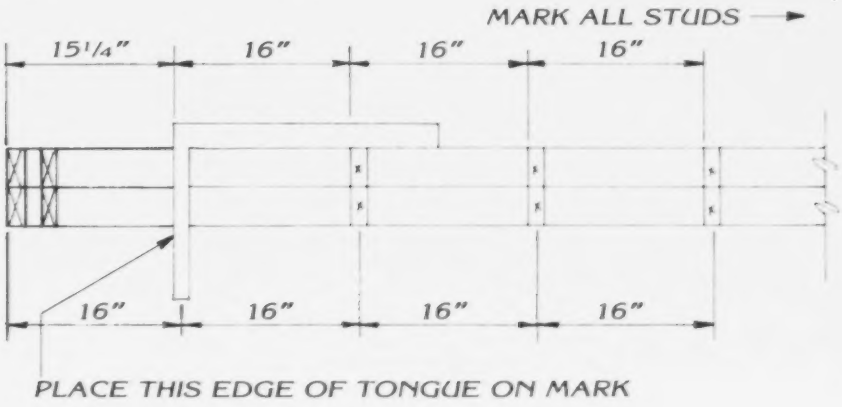


JOB SHEET #4

d. Use framing square to mark stud locations across both plates (See Figure 19)

(NOTE: Splices in the plate must fall at center of stud.)

FIGURE 19



3. Locate center of openings and lay off trimmer stud locations

a. Read the plan to determine distance from end of plate to center of opening

b. Measure required distance and mark on plate

c. Measure and mark one-half of header length on each side of center of opening

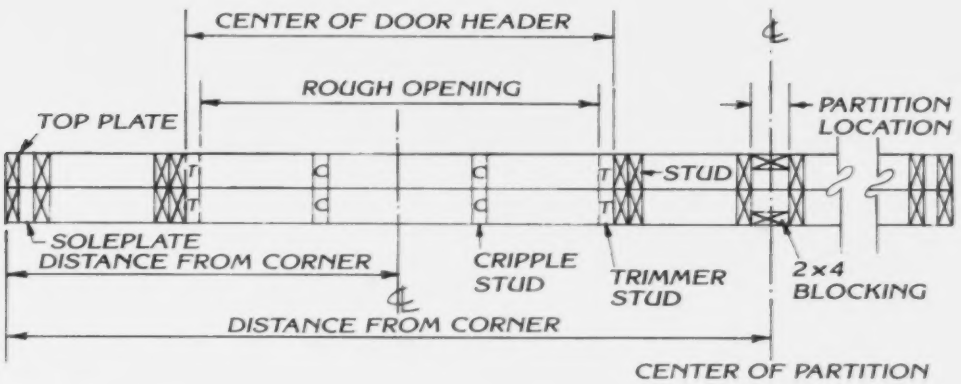
(NOTE: This locates outside of each trimmer stud.)

d. Mark trimmer stud locations with a "T" and cripple studs with a "C"

JOB SHEET #4

4. Locate and mark positions on the plates with the style of partition T you plan to use (Figure 20)

FIGURE 20



5. Lay off other walls, using same procedure

   (NOTE: Remember that end walls will fit between side walls; therefore, the plates will be shorter than the outside wall dimensions by the width of two plates.)

6. Remove nails from plates

7. Clean up work area and put away tools and materials

CARPENTRY LAYOUT
UNIT III

JOB SHEET #5 — LAY OUT CEILING JOISTS

I. Tools and materials

A. 100-foot tape with markings at 16-inch centers

B. Folding rule or steel tape

C. Framing square

II. Procedure

(NOTE: Ceiling joists are normally installed after the walls are erected and before the roof is framed. However, in laying out and installing ceiling joists, the roof design must be considered.

A. Lay out joist locations on double top plate

1. Determine the direction joists will run (usually the width of the structure)

2. Locate the outside of the first joist flush with the outside corner of the double top plate

3. Holding the zero end of the 100-foot tape 3/4 inch past the inside of the end double plate, mark 16-inch intervals on face of the plate, moving from left to right

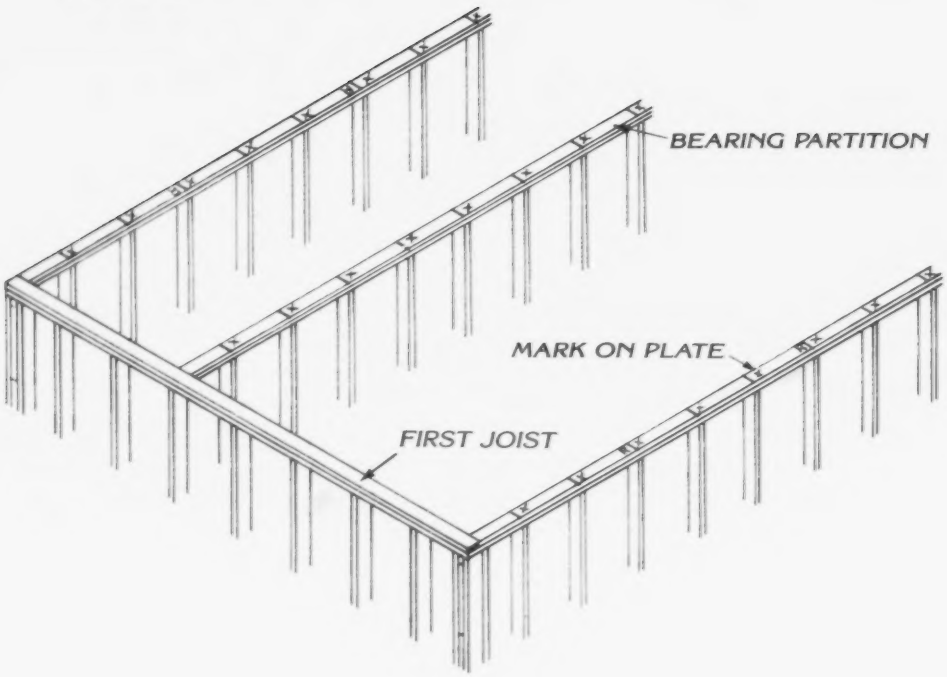
4. Place an "X" to the right of each mark for joists and an "R" on the left of every third mark for rafter set on two-foot centers

(NOTE: The "X" designates the side of the mark on which the joist is placed. The "R" designates the side of the mark on which the rafter is placed.)

B. Repeat steps A2 through A4 on the opposite wall or bearing partition, reversing the procedures of measurement, going from right to left (See Figure 21 on following page)

JOB SHEET #5

FIGURE 21



C. Clean up area and put away tools and materials

CARPENTRY LAYOUT
UNIT III

TEST

NAME _____ SCORE _____

1. Match terms associated with layout to their correct definitions. Write the correct numbers in the blanks.

_____a. Table on back side of body of the rafter square; used to find contents in board measure of boards and timbers

_____b. Main vertical framing members in walls

_____c. Wall that subdivides space within a building

_____d. Tables on the blade face of the framing square; used to determine lengths and cuts of rafters

_____e. Top and sides of a door or window frame that contact the door or window sash

_____f. Not tight or taut; sagging

_____g. Divisions or graduations found on the outer and inner edges of the framing square

_____h. Horizontal structural member that supports the load over an opening such as a window or door

_____i. Lower framing member attached to top part of bottom cripple studs to form the base of a rough opening for a window

_____j. Lowest and highest structural members of a wall to which studs are nailed

_____k. Table along center of back of the tongue of framing square; used to find lengths of common braces

_____l. Table in the center of the tongue face of framing square; used to lay out an eight-sided pattern

_____m. Wood block used as filler piece and support between frame members

_____n. Tool designed for layout work such as laying out stairs and determining length of rafters and pitch of roof

_____o. Opening in framing formed by framing members, such as openings for windows and doors

1. Plates
2. Scales
3. Jamb
4. Framing square
5. Essex board measure table
6. Studs
7. Rough sill
8. Rafter tables
9. Blocking
10. Brace measure table
11. Slack
12. Rough opening
13. Partition
14. Header
15. Eight square or octagon scale

TEST

2. Select from the following list types of tools and equipment needed for layout work. Write an "X" in the blank before each correct answer.

_____a. Try square

_____b. Pencil

_____c. Two 100-foot tapes

_____d. Folding rule

_____e. Steel tape

_____f. String line

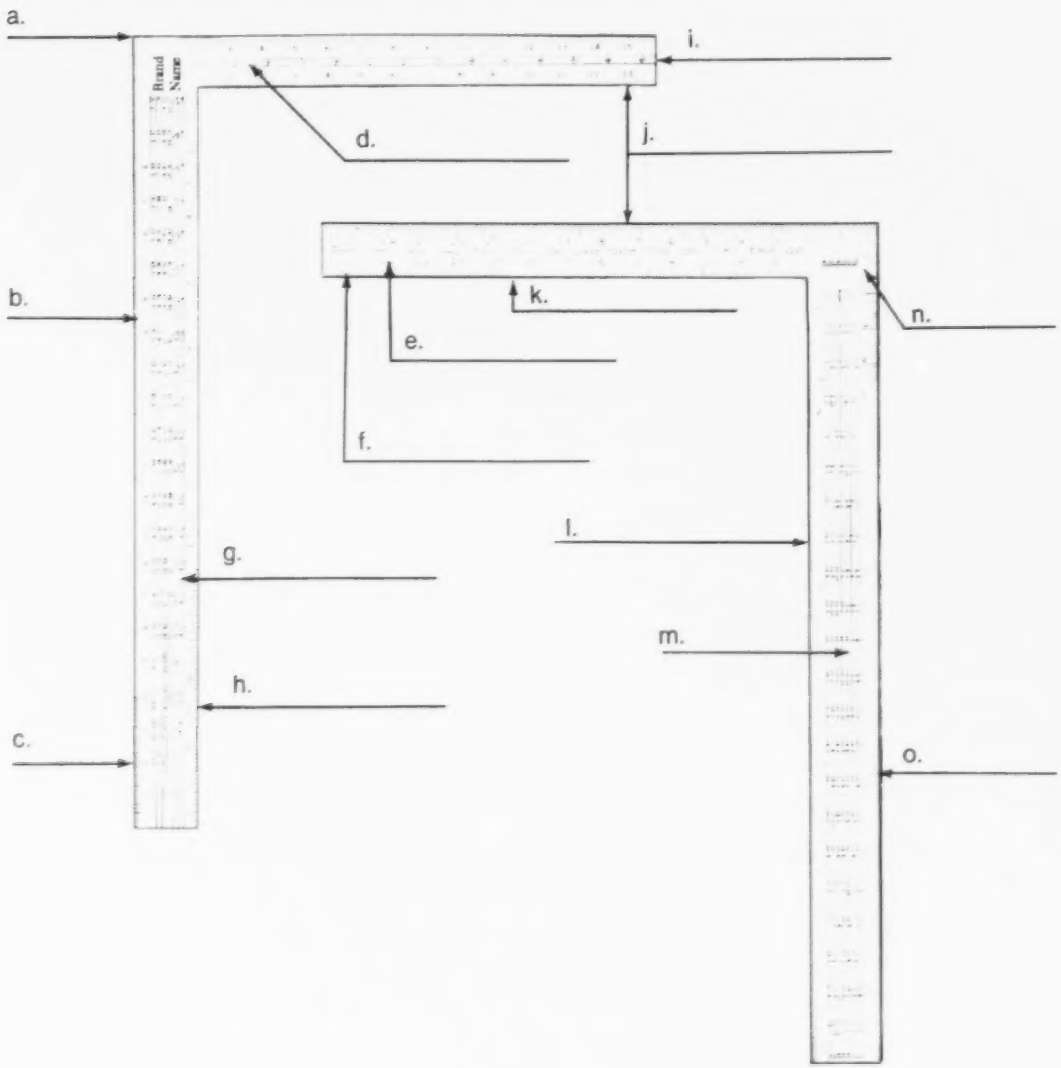
_____g. Plans

_____h. Level

TEST

3. Identify parts of the framing square illustrated. Write the correct names in the blanks.

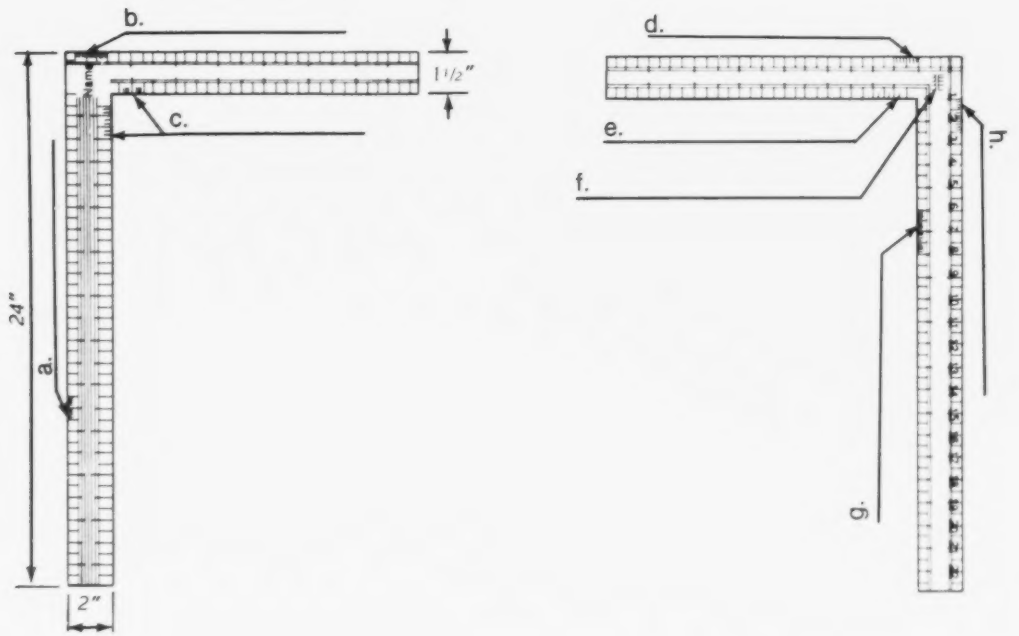
Body	**Heel**	**Rafter table**	**Eight square or octagon scale**
Scales	**Tongue**	**Hundredths scale**	
Face	**Back**	**Essex board measure table**	**Brace measure table**



TEST

4. Identify graduations on the framing square illustrated. Write the correct graduations in the blanks.

Eighths **Tenths** **Twelfths** **Sixteenths** **Hundredth scale**



5. List three common errors that contribute to inaccurate layout.

a. _____

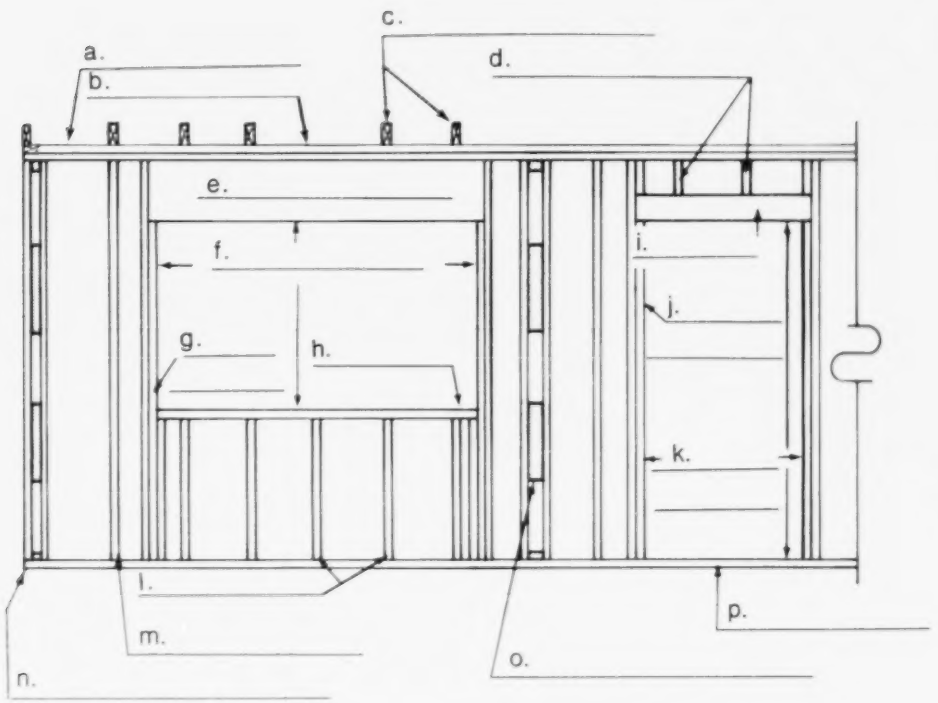
b. _____

c. _____

TEST

6. Identify framing members used in wall, partition, and ceiling framing as shown in the illustration below. Write the correct names in the blanks.

Top plate	**Double top plate**	**Cripple studs**	**Rough opening**
Soleplate	**Ceiling joists**	**Regular studs**	**Rough sill**
Header	**Corner assembly**	**Trimmer studs**	**Partition wall assembly**



TEST

(NOTE: Test question 7 lists the job sheets. They are an important part of this test. If they have not been completed, check with your instructor.)

7. Demonstrate the ability to

   a. Use a framing square and rule to lay out an 8-inch wall corner.

   b. Use a hand level.

   c. Lay out wall and partition locations on floor.

   d. Lay out sections for a structure.

   e. Lay out ceiling joists.

CARPENTRY LAYOUT
UNIT III

ANSWERS TO TEST

1.

a. 5	e. 3	i. 7	m. 9
b. 6	f. 11	j. 1	n. 4
c. 13	g. 2	k. 10	o. 12
d. 8	h. 14	l. 15	

2. b, c, d, e, g, h

3.

a. Heel
b. Face
c. Scales
d. Eight square or octagon scale
e. Brace measure table
f. Tongue
g. Rafter table
h. Body (blade)
i. Tongue
j. Scales
k. Scales
l. Body (blade)
m. Essex board measure table
n. Hundredths scale
o. Back

4.

a. Sixteenths
b. Sixteenths
c. Eighths
d. Twelfths
e. Tenths
f. Hundredths scale
g. Sixteenths
h. Twelfths

5. Answer should include any three of the following

a. Leaving slack in tape
b. Not aligning tape, rule, or square properly
c. Not placing end of tape or rule on reference point
d. Reading and recording incorrect numbers
e. Using a dull pencil
f. Not keeping square tight against workpiece
g. Using the square backwards when laying out studs, joists, or rafters

6.

a. Double top plate
b. Top plate
c. Ceiling joist
d. Cripple studs
e. Header
f. Rough opening
g. Trimmer studs
h. Rough sill
i. Header
j. Trimmer stud
k. Rough opening
l. Cripple studs
m. Regular studs
n. Corner assembly
o. Partition T assembly
p. Soleplate

7. Performance skills evaluated to the satisfaction of the instructor

CARPENTRY BASIC SKILLS
UNIT IV

UNIT OBJECTIVE

After completing this unit, the student should be able to use a hammer, hand saw, hand level, framing square, tape, and a rule properly. The student will show this knowledge by completing job sheets and unit test with a minimum score of 80 percent.

SPECIFIC OBJECTIVES

After completing this unit, the student should be able to

1. Match terms associated with basic skills to their correct definitions.
2. List basic carpentry skills that a student should be able to perform.
3. Label parts of a hammer.
4. Label parts of a hand saw.
5. Identify framing members used in wall and partition framing.
6. Complete drawings of common methods used to construct outside corners of wall frames.
7. Complete drawings of common methods used to construct partition Ts.
8. Identify types of headers.
9. Demonstrate the ability to
   a. Use a hammer properly.
   b. Use a hand saw properly.
   c. Construct solid headers.
   d. Construct wall corners.
   e. Construct partition Ts.

CARPENTRY BASIC SKILLS
UNIT IV

SUGGESTED ACTIVITIES

I. Unit contents

A. Objective sheet

B. Suggested activities

C. Information sheet

D. Job sheets

1. Job Sheet #1 — Use a Hammer Properly
2. Job Sheet #2 — Use a Hand Saw Properly
3. Job Sheet #3 — Construct Solid Headers
4. Job Sheet #4 — Construct Wall Corners
5. Job Sheet #5 — Construct Partition Ts

E. Test

F. Answers to test

II. Instructor's guide

A. Review unit and plan presentation.

B. Obtain materials necessary to supplement unit.

1. Competency profiles.

(NOTE: A master of the competency profile for this book is provided at the front of the instructor edition. You may duplicate the profile and distribute it to students as needed.)

2. Order film *The Wood Shell.* Color, 30 minutes, 1982 Circle Oak Productions, 73 Girdle Ridge Drive, Katonah, New York 10536, telephone 914-232-9451.

This film finishes the house that *The Foundation* started, and includes the building of walls, floors, ceilings, and roof.

SUGGESTED ACTIVITIES

(NOTE: This film is available only to Oklahoma teachers on a free-loan basis from the Oklahoma State Department of Vocational and Technical Education/Curriculum and Instructional Materials Center, 1500 West Seventh Avenue, Stillwater, Oklahoma 74074-4364. Out-of-state teachers must order from the address listed with the film.)

C. Introduce unit.

- Tour construction sites where frames are being constructed; point out the methods used to construct the various parts of the frame.
- Have students observe carpenters using hammers and saws and point out how easy it is for them when these tools are properly used.
- Show students the film *The Wood Shell.*

D. Provide students with objective sheet.

E. Discuss unit and specific objectives, relating them to previous units and your introduction to this unit.

F. Provide students with information sheet.

G. Discuss information sheet.

1. Use Information Sheet, Section I, to discuss terms and definitions associated with basic skills.
   - Use an actual construction site, a model, or building plans to illustrate appropriate parts.
   - Explain to the students the importance of knowing the wall framing members.
2. Use Information Sheet, Section II, to discuss basic skills that a student should be able to perform.
   - Provide each student with a tape, square, level, hammer, and saw.
   - Demonstrate how each of the tools is used.
   - Have each student demonstrate the proper use of each of these tools.
   - Emphasize the importance of using each of these tools properly.
3. Use Information Sheet, Section III, to discuss parts of a hammer.
   - Provide each student with a hammer; have each student identify each of the parts of a hammer.

SUGGESTED ACTIVITIES

- Explain to students the different types, sizes, and weights of claw hammers.

4. Use Information Sheet, Section IV, to discuss parts of a hand saw.

   - Provide each student with a hand saw; have each student identify each of the parts of the hand saw.

   - Show students examples of a rip saw and a cross cut saw and explain the difference between the two saws.

   - Show students the difference in the teeth on the two saws. Explain why there are more teeth on one saw than on another.

5. Use Information Sheet, Section V, to discuss framing members used in wall and partition framing.

   - Relate framing members to terms and definitions.

   - Use a model or a full-size wall to illustrate the parts, emphasizing how the parts fit together to provide the required strength.

6. Use Information Sheet, Section VI and VII, to discuss methods used to construct corner and partition T assemblies.

   - Construct a model of each type of assembly.

   - Discuss advantages and disadvantages of each type.

   - Discuss other types of assemblies.

7. Use Information Sheet, Section VIII, to discuss types of headers.

   - Demonstrate the construction of a model of each type of header.

   - Take a field trip to a construction site where different types of headers are used; discuss the different types and why they are used.

   - Acquaint students with the use of header schedules and span charts.

H. Provide students with job sheets.

I. Demonstrate job sheet procedures and allow students to practice.

   - Try to get the students to plan the procedures and to visualize the final outcome.

   - Relate each of the procedures to the basic skills listed in Section II of this unit.

SUGGESTED ACTIVITIES

J. Review unit.

K. Give test.

L. Critique test and discuss it in class.

M. Reteach and retest as necessary.

N. Complete appropriate sections of competency profiles.

III. Unit reference.

A. Hendrix, Laborn J. "Bud." *Commercial Carpentry*. Stillwater, Oklahoma: Oklahoma State Department of Vocational and Technical Education/Curriculum and Instructional Materials Center, and The Associated General Contractors of America, 1986.

B. *Stanley Tool Guide*. New Britain, Connecticut: Stanley Tools, Division of the Stanley Works, 1968.

CARPENTRY BASIC SKILLS
UNIT IV

INFORMATION SHEET

I. Terms and definitions associated with basic skills

A. **Partition** — Wall that subdivides space within a building

B. **Stud** — Main vertical framing member in walls and partitions

C. **Soleplate** — Lowest horizontal member of a wall or partition to which the studs are nailed; rests on the rough floor

D. **Top plate** — Upper horizontal structural member of a wall used to carry the rafters or trusses of a roof

E. **Double top plate** — Top plate made of two members to allow better stiffening of the wall and for tying together splices, corners, and partitions that are at right angles to a wall

F. **Cripple stud** — Any part of a framing stud that is cut less than full size, as over a door, window, or under a window opening

G. **Blocking (spacer)** — Wood block used as filler piece and support between framing members

H. **Header** — Horizontal structural member that supports the load over an opening, such as a window or door

I. **Jamb** — Top and sides of a door or window frame that contact the door or window sash; consists of a head jamb and side jambs

J. **Rough opening** — Opening in framing formed by framing members, such as for windows or doors

K. **Rough sill** — Lower framing member attached to top of the bottom cripple studs to form the base of a rough opening for a window

L. **Trimmer** — Vertical framing member that forms the side of rough openings for doors and windows and on which the header rests

II. Basic carpentry skills that a student should be able to perform

A. Use a hammer properly

B. Use a hand saw properly

C. Use a framing square properly

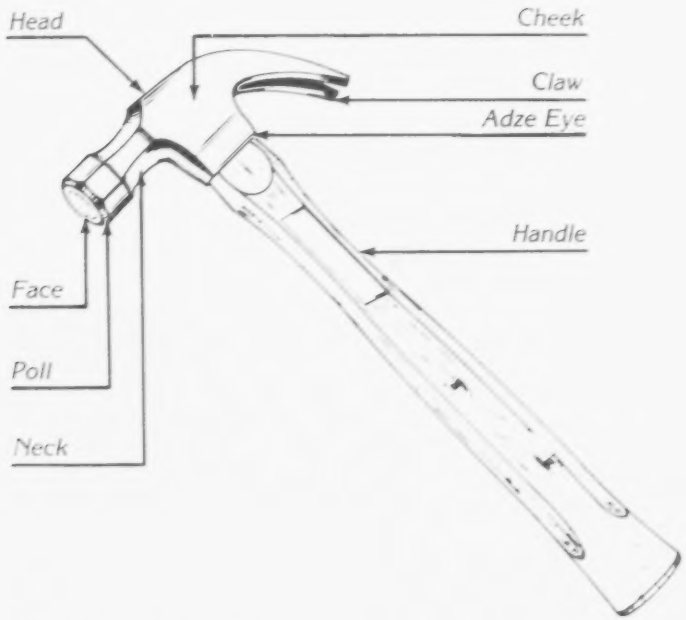
INFORMATION SHEET

D. Use a hand level properly

E. Use a rule and tape properly

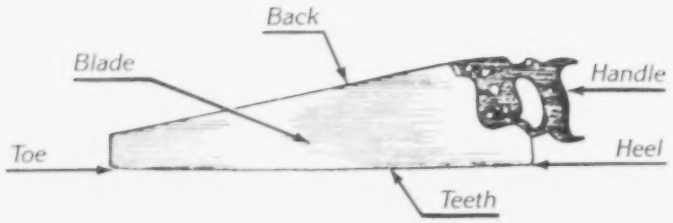
III. Parts of a hammer (Figure 1)

FIGURE 1



IV. Parts of a hand saw (Figure 2)

FIGURE 2

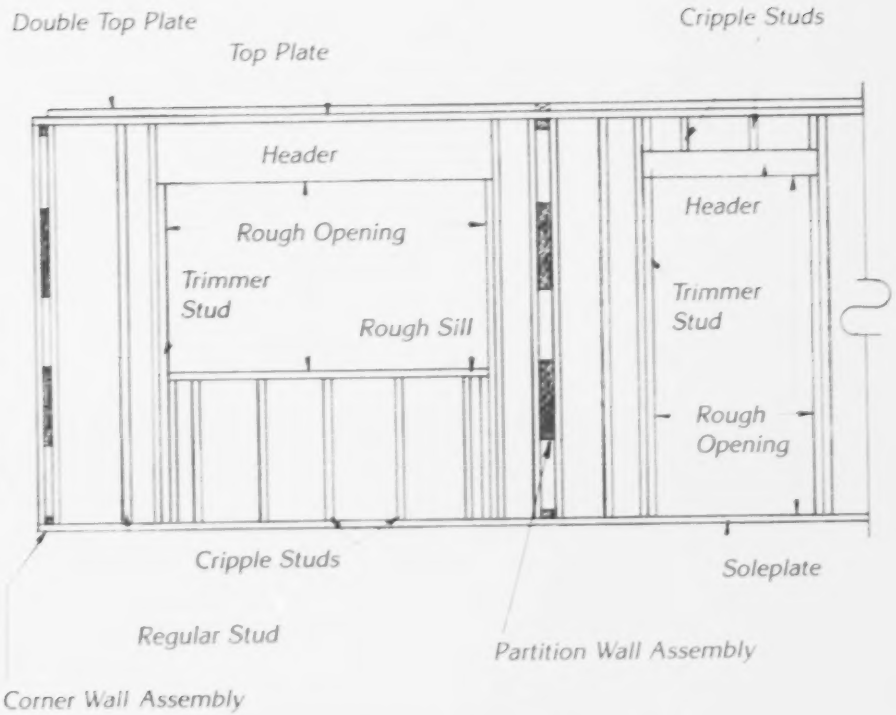


Figures 1 and 2 used with permission of Stanley Tools, 1968.

INFORMATION SHEET

V. Wall and partition framing members (Figure 3)

FIGURE 3



VI. Methods used to construct outside corners of wall frames

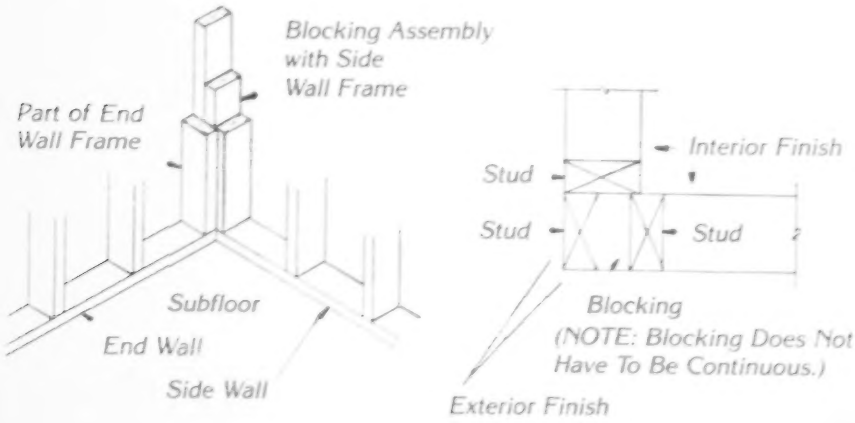
(NOTE: The methods shown are just two possible methods; many others exist. The important considerations are a solid corner and nailing surfaces for the interior and exterior wall finishes. Most carpenters try to choose the straightest, least defective studs for corner assemblies. The methods shown can be used for 2×4 or 2×6 studs.)

INFORMATION SHEET

A. Constructed with three full studs and blocking (Figure 4)

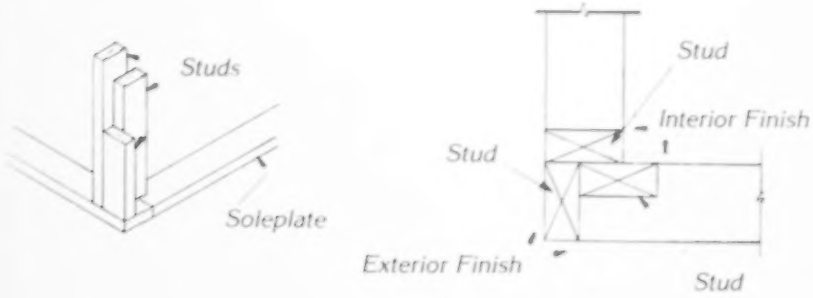
(NOTE: This is the most common method used.)

FIGURE 4



B. Constructed with three full studs (no blocking) (Figure 5)

FIGURE 5



VII. Methods used to construct partition Ts

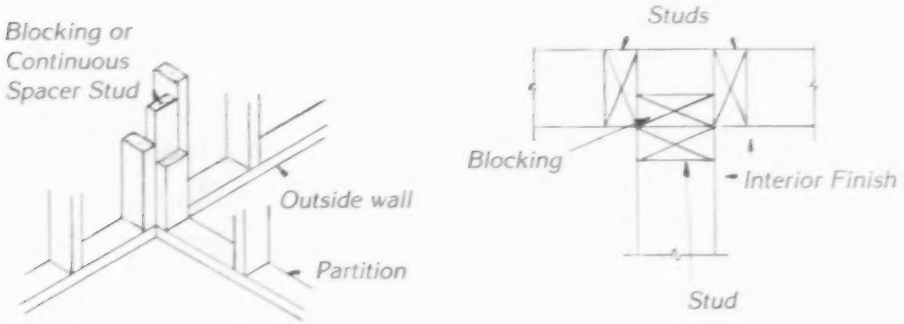
(NOTE: Several methods for tying in partition walls exist. Some of the more common are shown on the following page.)

INFORMATION SHEET

A. Constructed with three studs and blocking (Figure 6)

(NOTE: This is the most common method and can be used with 2×4 or 2×6 studs.)

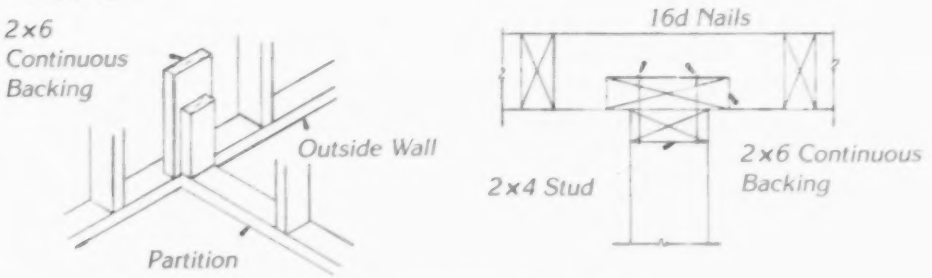
FIGURE 6



B. Constructed with a continuous backer (Figure 7)

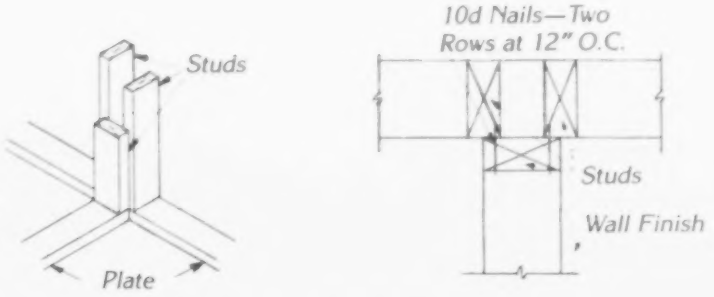
(NOTE: The method shown is for 2×4 framing, but variations exist for 2×6 framing.)

FIGURE 7



C. Constructed with three studs (no blocking) (Figure 8)

FIGURE 8



INFORMATION SHEET

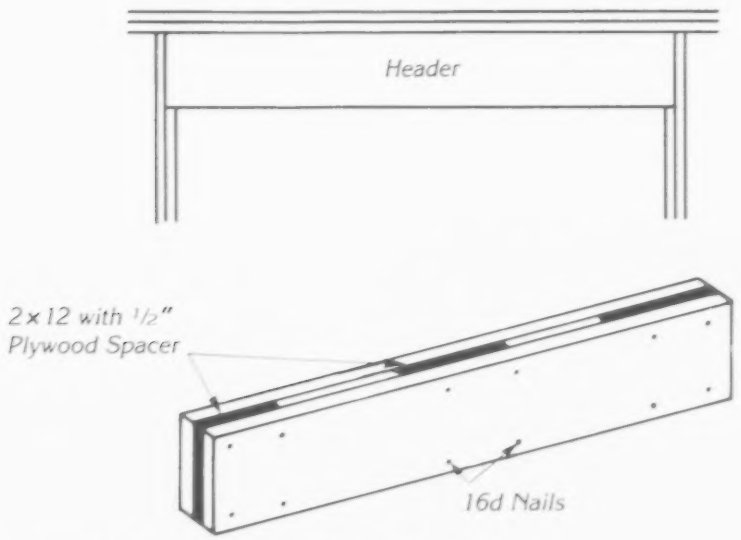
VIII. Types of headers

(NOTE: There are many different types of headers. These are some of the most common types.)

A. Solid or full header (Figure 9)

(NOTE: Full header is used for large openings and fills the area from the rough opening to the bottom of the top plate.)

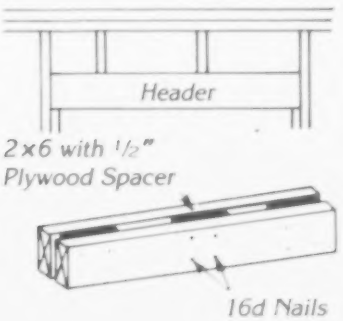
FIGURE 9



B. Small header with cripples (Figure 10)

(NOTE: A small header with cripples may be used for average size windows and doors and is usually constructed of 2×4s or 2×6s.)

FIGURE 10



INFORMATION SHEET

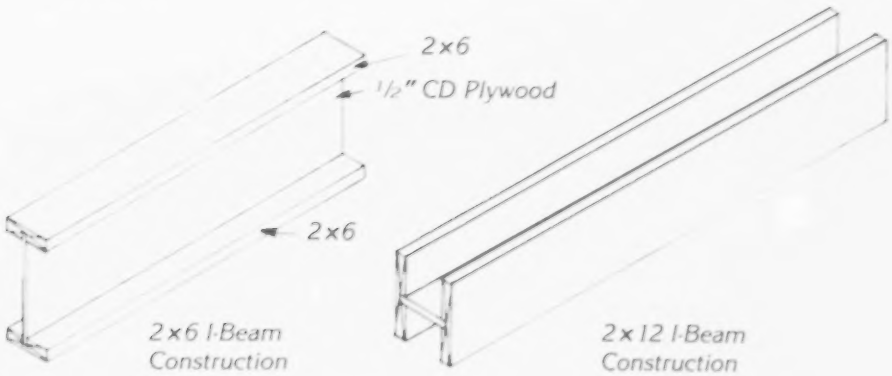
C. Truss header (Figure 11)

(NOTE: Truss headers are used when the load is especially heavy or the span is extra wide. The design of trusses is usually included in the architectural plans.)

FIGURE 11

D. I-beam header (Figure 12)

FIGURE 12



E. Box beam header (Figure 13)

FIGURE 13

CARPENTRY BASIC SKILLS
UNIT IV

JOB SHEET #1 — USE A HAMMER PROPERLY

I. Tools and materials

A. Claw hammer

B. Nails

C. Two 2×4 blocks

II. Procedure

A. Drive nails

1. Grasp hammer handle firmly near the end (Figure 14)

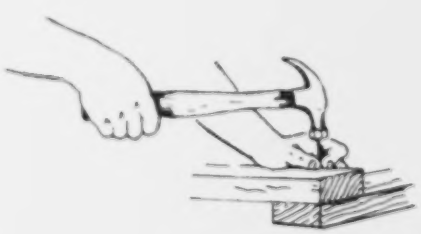
2. Place one 2×4 on top of another 2×4

FIGURE 14

Used with permission of Stanley Tools, 1968.

3. Rest face of hammer on the nail held in other hand (Figure 15)

FIGURE 15



Adapted with permission of Stanley Tools, 1968.

JOB SHEET #1

4. Raise the head of hammer and give a light tap to start nail and to determine the aim (Figure 16)

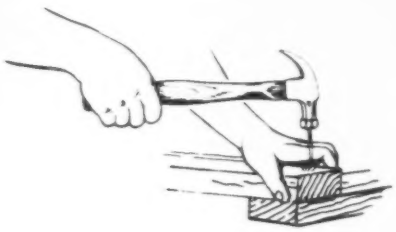
   (NOTE: This maneuver is accomplished through the wrist, elbow, and shoulder with one or all being used according to the strength of the blow to be struck.)

FIGURE 16

5. Strike the nail squarely to avoid marring the wood and bending the nail (Figure 17)

   (NOTE: Keep face of hammer clean to avoid its slipping off the nail.)

FIGURE 17



Figures 16 and 17 adapted with permission of Stanley Tools, 1968.

JOB SHEET #1

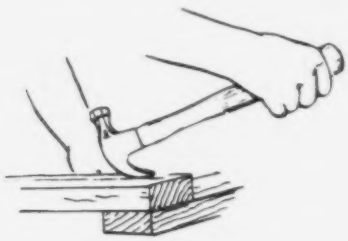
B. Draw (pull) nails

1. Grasp hammer handle firmly near the end, just opposite from the grasp used for driving nails (Figure 18)

FIGURE 18

2. Slip claw of the hammer under the nail head and apply pressure (Figure 19)

FIGURE 19



3. Continue applying pressure by pulling back on the handle until the handle is nearly vertical (Figure 20)

FIGURE 20

Figures 18-20 adapted with permission of Stanley Tools, 1968.

(NOTE: If pull is continued, the unnecessary force will bend the nail, mar the wood, and possibly break the hammer handle.)

JOB SHEET #1

4. Release the pressure and slide a piece of wood under the hammer head; apply pressure again (Figure 21)

FIGURE 21

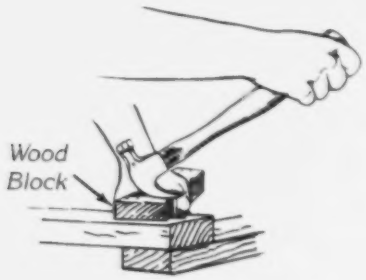


Figure 21 adapted with permission of Stanley Tools, 1968.

(NOTE: The piece of wood will increase leverage but will relieve the strain on the handle.)

C. Clean work area, and put away tools and materials

CARPENTRY BASIC SKILLS
UNIT IV

JOB SHEET #2 — USE A HAND SAW PROPERLY

I. Tools and materials

A. Cross cut hand saw

B. Rip hand saw

C. Pencil

D. One set sawbucks

E. 2×4 about 4-feet long

F. 1×6 about 4-feet long

II. Procedure

A. Cross cutting

1. Lay piece of 2×4 to be cut across the two sawbucks
2. Mark a line across one end of the 2×4
3. Grasp hand saw firmly by the handle (Figure 22)

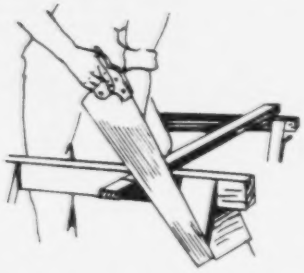
FIGURE 22

Figure 22 adapted with permission of Stanley Tools, 1968.

JOB SHEET #2

4. Place one knee on 2×4 to hold it firmly in place; align saw blade with mark on 2×4 (Figure 23)

FIGURE 23

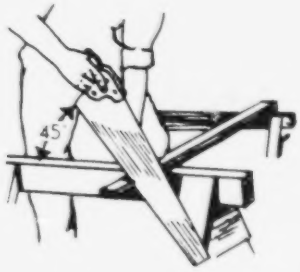


5. Position saw at about 45-degree angle with the 2×4 and start the cut by drawing the saw backward then forward (Figure 24)

CAUTION

Always cut on the waste side of the mark.

FIGURE 24



(NOTE: Hold blade of saw square to the stock, and steady the blade at the mark with your thumb.)

6. Continue these procedures until the cut is made

Figures 23 and 24 adapted with permission of Stanley Tools, 1968.

JOB SHEET #2

B. Rip sawing

1. Lay piece of 1×6 to be cut across the two saw bucks
2. Mark a line lengthwise on the 1×6
3. Grasp hand saw firmly by the handle (Figure 25)

FIGURE 25

Figure 25 adapted with permission of Stanley Tools, 1968.

4. Place one knee on the 1×6 to hold it firmly in place; align saw blade with mark on 1×6, steadying the saw with your thumb and keeping it at a 90-degree angle (Figure 26)

FIGURE 26

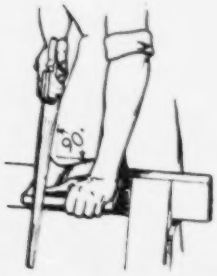


Figure 26 used with permission of Stanley Tools, 1968.

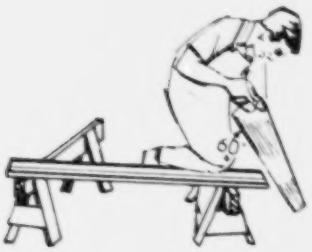
JOB SHEET #2

5. Start the cut by drawing the saw backward, then moving it forward while keeping the saw at a 60-degree angle with the 1×6 (Figure 27)

CAUTION

Always cut on the waste side of the mark.

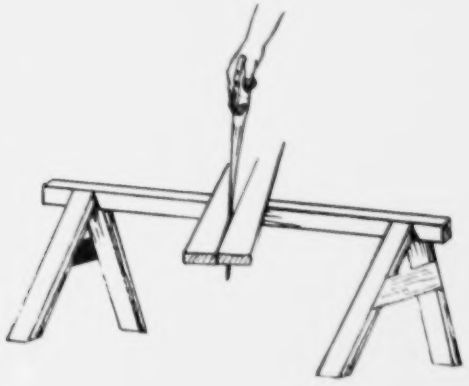
FIGURE 27



6. Continue following the above procedures to rip the board

7. If the saw wanders from the line, twist the handle slightly and draw it back to the line (Figure 28)

FIGURE 28

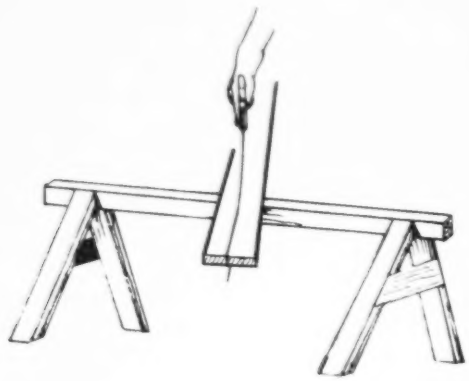


Figures 27 and 28 adapted with permission of Stanley Tools, 1968.

JOB SHEET #2

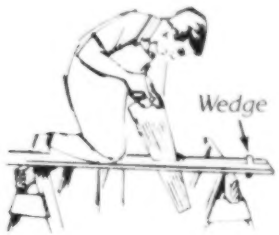
8. If the saw is not square to the stock, bend it slightly and gradually straighten it; but be very careful not to kink the blade (Figure 29)

FIGURE 29



9. After cutting several inches in from the end of the board, remove the saw, slide the board back, and then reinsert the blade into the saw kerf and continue cutting; if the blade binds, you may need to insert a small wedge in the saw kerf (Figure 30)

FIGURE 30



Figures 29 and 30 adapted with permission of Stanley Tools, 1968.

10. Continue sawing board until cut is completed

C. Clean up work area, and put away tools and materials

CARPENTRY BASIC SKILLS
UNIT IV

JOB SHEET #3 — CONSTRUCT SOLID HEADERS

I. Tools and materials

A. Claw hammer

B. Hand saw

C. Folding rule or steel tape

D. Framing square

E. Pencil

F. One set sawbucks

G. 2×4 header material

H. 1/2-inch plywood for spacers cut to size

I. 16d box nails

II. Procedure

A. Lay 2×4 on sawbucks, measure, and mark to length (determined by instructor)

B. Use framing square and pencil to square the mark across 2×4

C. Cut 2×4 to length

CAUTION

Always cut on the waste side of the mark.

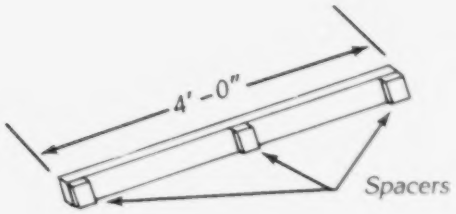
D. Use first 2×4 as a pattern to mark second 2×4

E. Cut second 2×4 to length

JOB SHEET #3

F. Lay one 2×4 on a solid base and arrange spacers 16 to 24 inches apart along the 2×4 (Figure 31)

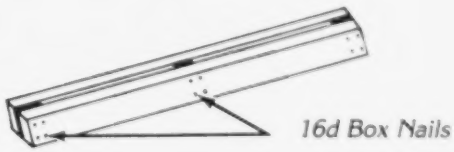
FIGURE 31



G. Place second 2×4 on top of spacers with all edges even with the first 2×4

H. Hold second 2×4 in place and drive nails into it, following procedures in Job Sheet #1 (Figure 32)

FIGURE 32



I. Clean up work area, and put away tools and materials

CARPENTRY BASIC SKILLS
UNIT IV

JOB SHEET #4 — CONSTRUCT WALL CORNERS

I. Tools and materials

A. Claw hammer

B. Hand saw

C. Folding rule or steel tape

D. Framing square

E. Pencil

F. One set sawbucks

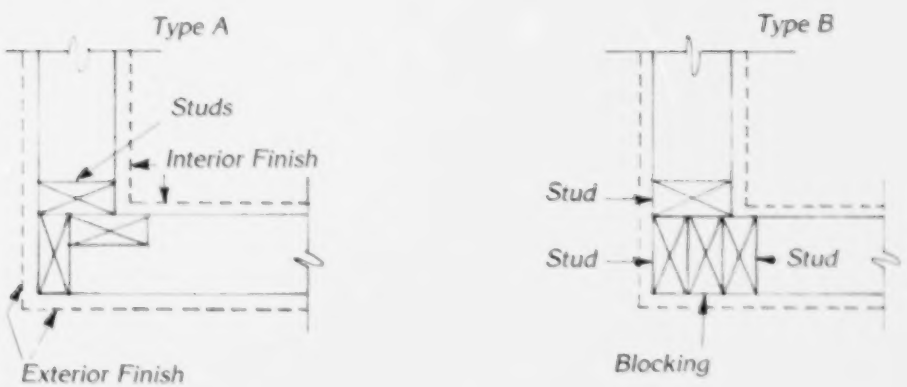
G. 2×4 stud and blocking material

H. 16d box nails

II. Procedure

A. Determine type of corner to use (Figure 33)

FIGURE 33



B. Construct type B corner

(NOTE: Type B corners are preferred by most builders.)

1. Lay 2×4 on sawbucks, measure, and mark studs to length (determined by instructor)

2. Use framing square and pencil to square the mark across 2×4

JOB SHEET #4

3. Cut studs to length

CAUTION

Remember to cut on the waste side of the mark.

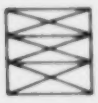
4. Select three of the straightest studs for the corner

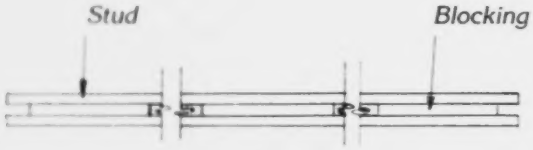
5. Use three blocking pieces for each corner

(NOTE: Blocking pieces are usually 10 to 16 inches long, but for this exercise they may be shorter, assuming that the corners will be built out of the shorter stock.)

6. Lay one stud on a solid base, arrange blocking on this stud, then place second stud on top of the blocking with all edges even with the first stud (Figure 34)

FIGURE 34

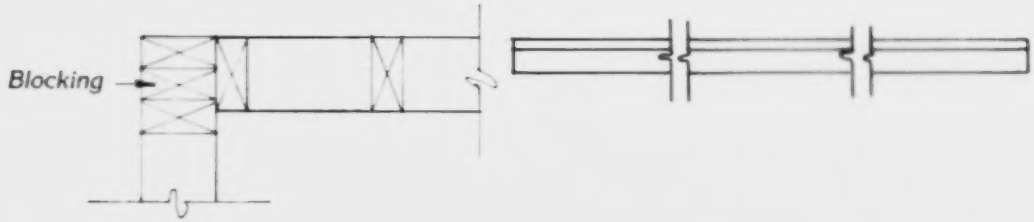




7. Nail studs together with blocking between and all edges even

8. Lay third stud in place and nail to corner assembly (Figure 35)

FIGURE 35



(NOTE: Third stud may be attached to end of wall and nailed to corner assembly as walls are erected.)

C. Clean up work area, and put away tools and materials

CARPENTRY BASIC SKILLS
UNIT IV

JOB SHEET #5 — CONSTRUCT PARTITION Ts

I. Tools and materials

A. Claw hammer

B. Hand saw

C. Folding rule or steel tape

D. Framing square

E. Pencil

F. One set sawbucks

G. 2×4 stud and blocking material

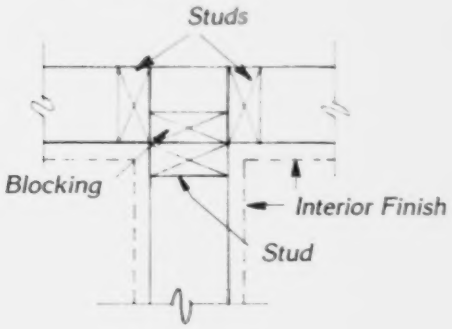
H. 16d box nails

JOB SHEET #5

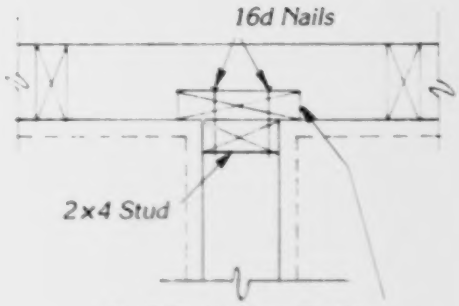
II. Procedure

A. Determine type of T to use (Figure 36)

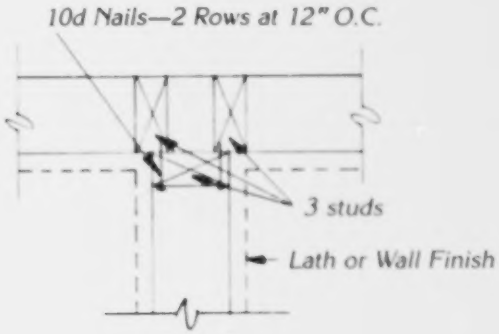
FIGURE 36



Type A



Type B



Type C

B. Construct type A Ts

(NOTE: Type A is preferred by most builders.)

1. Lay 2×4 on sawbucks, measure, and mark studs to length (determined by instructor)
2. Use framing square and pencil to square the mark across 2×4
3. Cut studs to length

CAUTION

Remember to cut on the waste side of the mark.

JOB SHEET #5

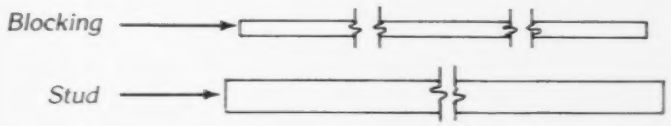
4. Select three of the straightest studs for each T

5. Use three blocking pieces for each T

   (NOTE: Blocking pieces are usually 10 to 16 inches long, but for this exercise they may be shorter, assuming that the Ts will be built out of shorter stock.)

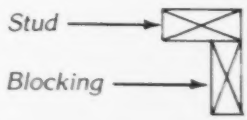
6. Arrange blocking on edge of a solid base so that there will be one at each end and one in the center of the studs (Figure 37)

FIGURE 37



7. Lay first stud on top of blocking with one edge even with edge of blocks; nail them together (Figure 38)

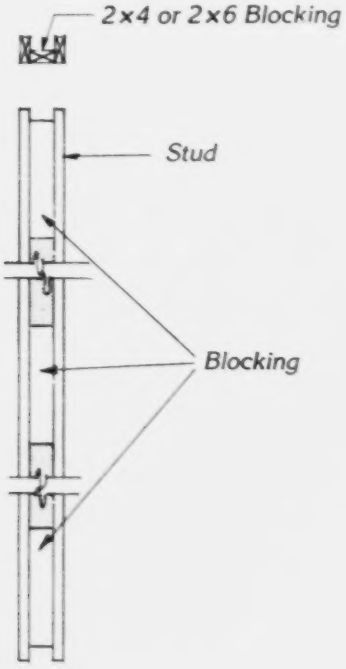
FIGURE 38



JOB SHEET #5

8. Lay second stud on top of blocking with edges even with first stud; nail them together (Figure 39)

FIGURE 39

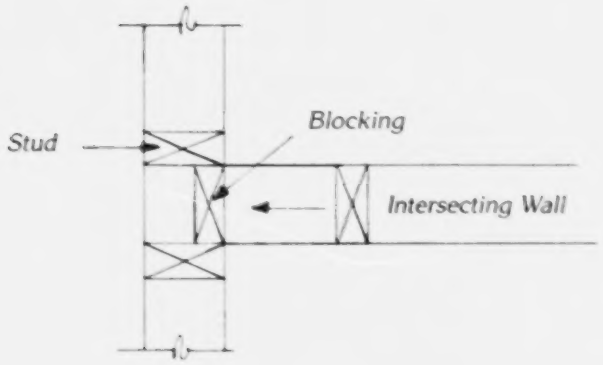


JOB SHEET #5

9. Lay third stud in place; nail it to corner assembly

   (NOTE: Third stud may be attached to end of the intersecting wall and nailed to blocking as walls are erected (Figure 40)

FIGURE 40



C. Clean up work area, and put away tools and materials

CARPENTRY BASIC SKILLS
UNIT IV

TEST

NAME _____ SCORE _____

1. Match terms associated with wall and ceiling framing to their correct definitions. Write the correct numbers in the blanks.

_____a.	Top and sides of a door or window frame that contact the door or window sash; consists of a head jamb and side jambs	1. Header
_____b.	Lowest horizontal member of a wall or partition to which the studs are nailed; rests on the rough floor	2. Top plate
_____c.	Horizontal structural member that supports the load over an opening, such as a window or door	3. Blocking (spacer)
_____d.	Lower framing member attached to top of the bottom cripple studs to form the base of a rough opening for a window	4. Stud
_____e.	Vertical framing member that forms the side of rough openings for doors and windows and on which the header rests	5. Jamb
_____f.	Wood block used as filler piece and support between framing members	6. Rough opening
_____g.	Any part of a framing stud that is cut less than full size, as over a door, window, or under a window opening	7. Cripple stud
_____h.	Main vertical framing member in walls and partitions	8. Double top plate
_____i.	Upper horizontal structural member of a wall used to carry the rafters or trusses of a roof	9. Soleplate
_____j.	Top plate made of two members to allow better stiffening of the wall and for tying together splices, corners, and partitions that are at right angles to a wall	10. Partition
		11. Rough sill
		12. Trimmer

TEST

_____k. Opening in framing formed by framing members, such as for windows or doors

_____l. Wall that subdivides space within a building

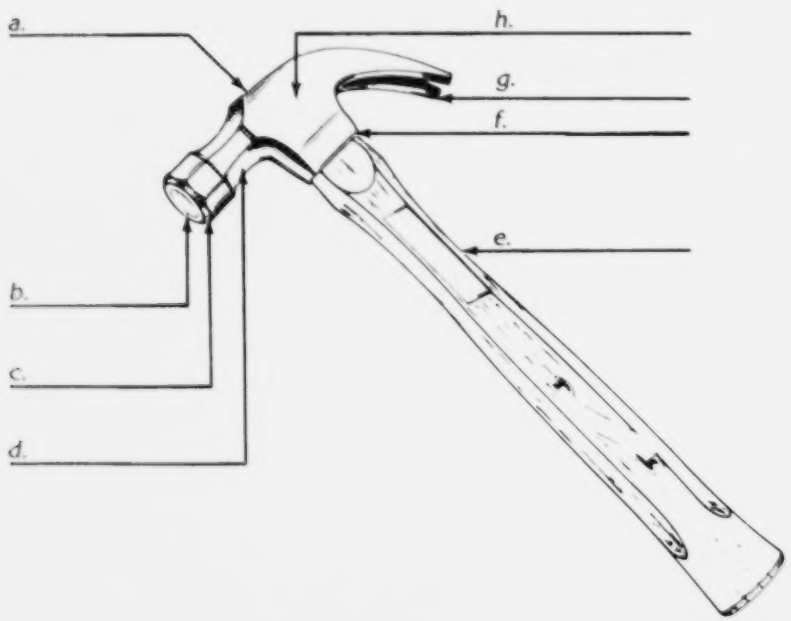
2. List three basic carpentry skills that a student should be able to perform.

a. _____

b. _____

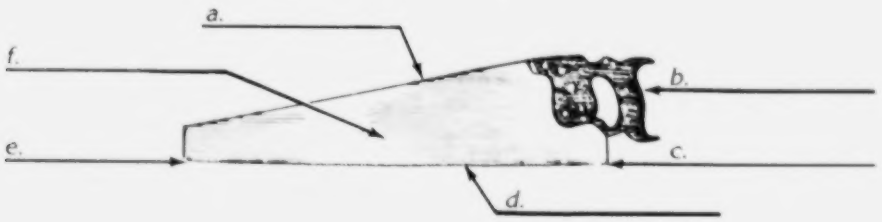
c. _____

3. Label parts of the hammer illustrated below. Write the correct names in the blanks.



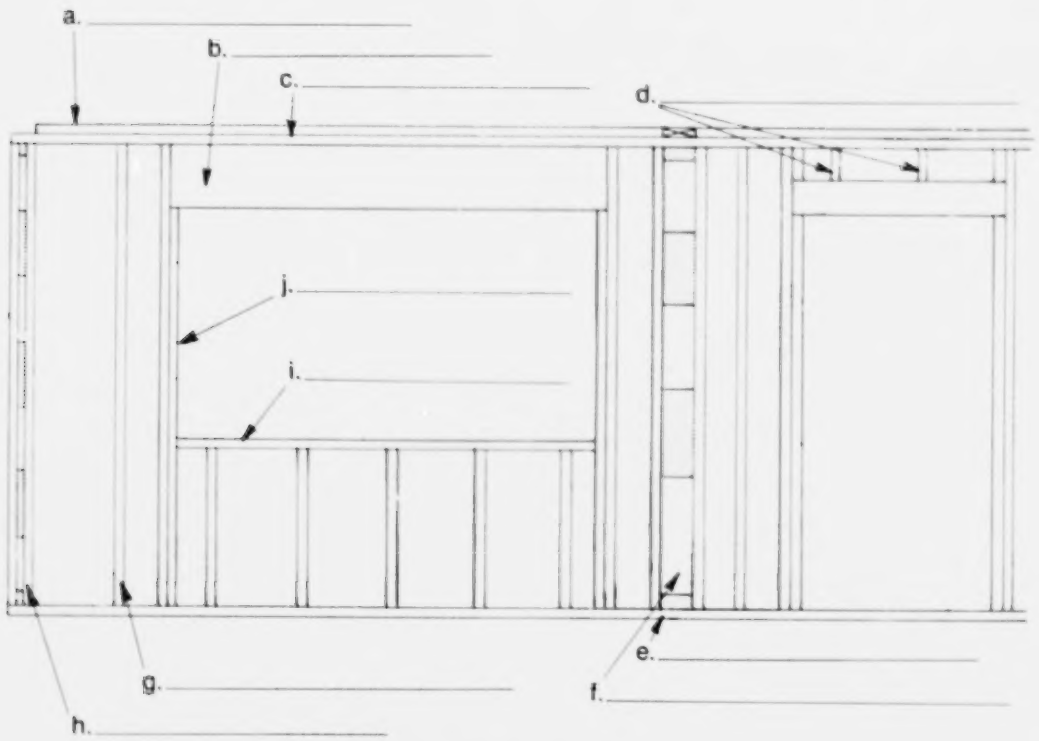
TEST

4. Label parts of the hand saw illustrated below. Write the correct names in the blanks.



5. Identify the framing members in the following illustration. Write the correct names in the blanks.

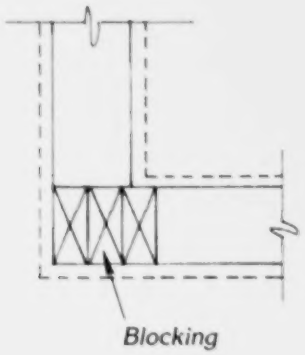
Corner assembly	**Partition wall assembly**	**Soleplate**	**Trimmer stud**
Cripple studs	**Double top plate**	**Header**	**Top plate**
Rough sill	**Regular stud**		



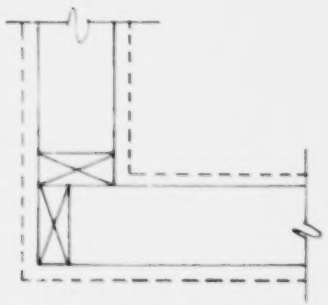
TEST

6. Complete drawings of common methods used to construct outside corners of wall frames. Draw in the missing member of each illustration below.

   a. Constructed with three full studs and blocking



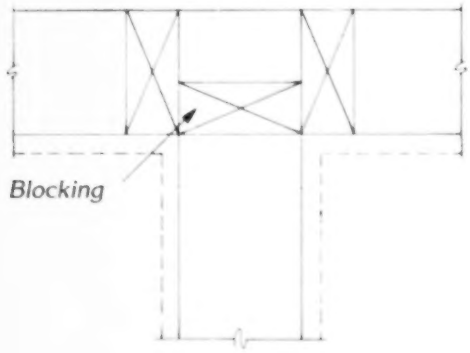
   b. Constructed with three full studs (no blocking)



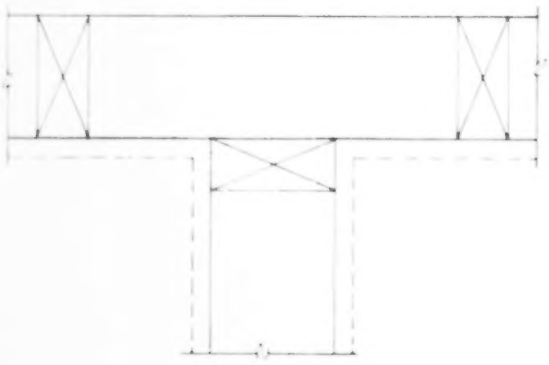
TEST

7. Complete drawings of common methods used to construct partition Ts. Draw in the missing member in each of the following illustrations.

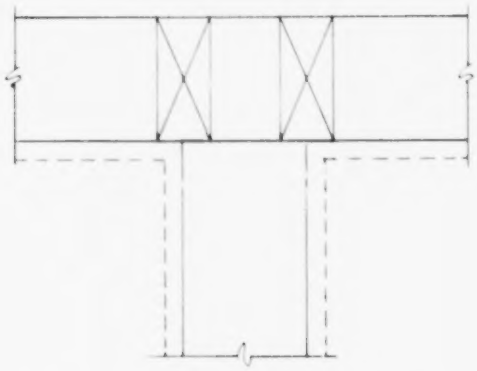
   a. Constructed with three studs and blocking



   b. Constructed with a continuous backer

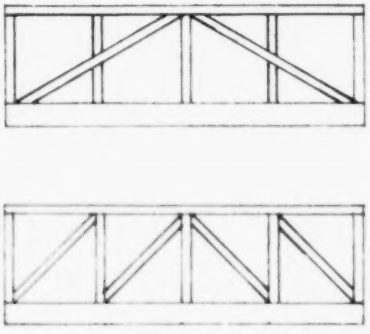


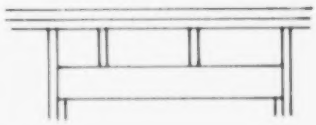
c. Constructed with three studs (no blocking)



8. Identify the types of headers illustrated below. Write the correct names in the blanks.

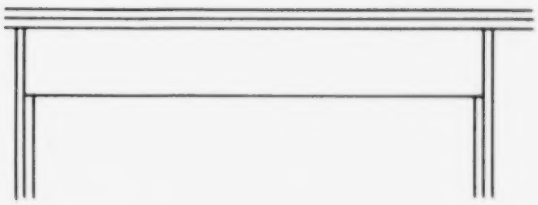
Solid or full header **Truss header** **Box beam header**
Small header with cripples **I-beam header**



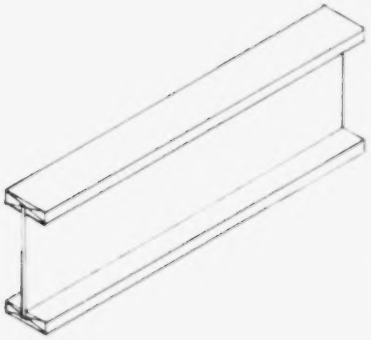


a. _____ b. _____

TEST



c. _____ d. _____



e. _____

TEST

(NOTE: Test question 9 lists the job sheets. They are an important part of this test. If they have not been completed, check with your instructor.)

9. Demonstrate the ability to

   a. Use a hammer properly.

   b. Use a hand saw properly.

   c. Construct solid headers.

   d. Construct wall corners.

   e. Construct partition Ts.

CARPENTRY BASIC SKILLS
UNIT IV

ANSWERS TO TEST

1.

a. 5	e. 12	i. 2
b. 9	f. 3	j. 8
c. 1	g. 7	k. 6
d. 11	h. 4	l. 10

2. Answer should include any three of the following

   a. Use a hammer properly
   b. Use a hand saw properly
   c. Use a framing square properly
   d. Use a hand level properly
   e. Use a rule and tape properly

3.

a. Head	e. Handle
b. Face	f. Adze eye
c. Poll	g. Claw
d. Neck	h. Cheek

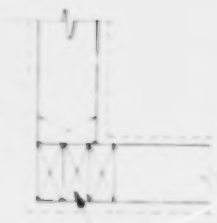
4.

a. Back	d. Teeth
b. Handle	e. Toe
c. Heel	f. Blade

5.

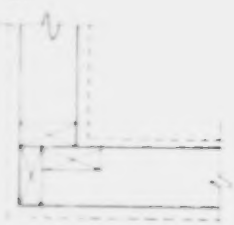
a. Double top plate	f. Partition wall assembly
b. Header	g. Regular stud
c. Top plate	h. Corner assembly
d. Cripple studs	i. Rough sill
e. Soleplate	j. Trimmer stud

6. a.



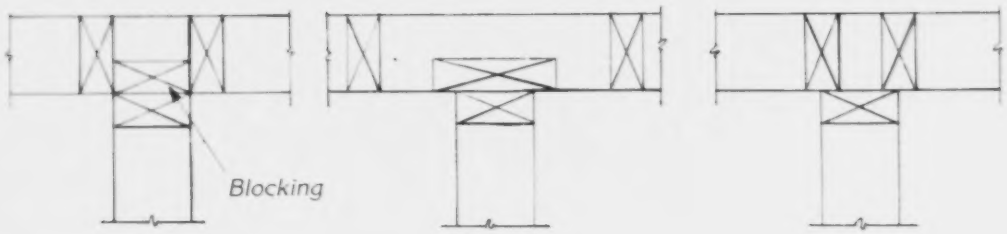
Blocking

b.



ANSWERS TO TEST

7. a. b. c.



8. a. Truss header
   b. Small header with cripples
   c. Solid or full header
   d. Box beam header
   e. I-beam header

9. Performance skills evaluated to the satisfaction of the instructor